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ABSTRACT

This guide contains 30 lesson plans contributed by seven teachers and two curriculum specialists that exemplify how to make learning active, contextual, and career focused. Each lesson plan format identifies the SCANS (Secretary's Commission on Achieving Necessary Skills) addressed by that lesson. The introductory section explains how to enhance lesson plans and outlines the SCANS competencies and foundation skills and qualities. Some of the topics covered in the lesson plans include the following: buying a car, career interviewing using the Internet, career simulation, creating a model town, evaluation of careers that require mathematics, mock interviewing, occupation observations, problem-solving scenarios, recycle city, seven habits of effective people, total quality problem solving, tower team building, and working lines. The guide also includes information on enhancing lesson plans; classroom, support, and school-to-work resources; and forms for feedback from readers. An annotated classroom resource section lists a total of 120 print, multimedia, and Internet resources in the following categories: language arts and communications, integrated mathematics and science, mathematics, science, social studies, and career education. An additional resource section lists 20 Internet, 24 print, and 2 film/video resources supporting applied and contextual teaching. A school-to-work resources section lists 8 print publications and 19 web sites. (KC)

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A Teacher's How-To Guide for School-to-Work

with interactive lesson plans

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School-to-Work in ACTION 4 REGION

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Introduction

About This Guide

You CAN Do School-to-Work! That's our message. Connecting classrooms to workplaces in ways that motivate kids and improve academic achievement is not an "add on"; it is the *very work of good teaching*. Helping kids become career smart and focusing on the application of knowledge to solve real life problems is not for some kids and some teachers, it is for *every* classroom. A structure that models the life skills of teamwork, work ethic, a positive attitude and willingness to learn is right for every classroom and every school building. School-to-Work is not for some other teacher; it's for YOU!

To show you how easy it is to make learning active, contextual, and career focused, we invited seven teachers and two curriculum specialists from around our region to compile lesson plans they have taught or gathered from others that exemplify school-to-work principles in the classroom. This Guide is the result of their work. These lessons can be taught as is, modified for your particular objectives, or used as a template to create your own. Each lesson plan carries the name and contact information of the teacher who has taught it, so you can confer with that teacher directly if you have questions or suggestions.

Finally, any part of this Guide may be copied for classroom use.

Enhance Your Present Lessons — It's Easy!

Any lesson can become a career-focused lesson by taking the following steps:

- Pick any curriculum objective, standard, or lesson that you currently teach.
- Identify any careers or "real world applications that come to mind when you think about your objective or lesson. Who "out there" uses this skill or information in the course of their daily work?
- Create a plan to enhance your present lesson by developing activities that help students to become "career smart" while they develop skills valued in the workplace. Complete the "Lesson Enhancer" worksheet attached.

Teach the SCANS Skills.

Each lesson plan format identifies the SCANS skills that are addressed by that lesson. In 1991, the Secretary's Commission on Achieving Necessary Skills (SCANS, U. S. Department of Labor) issued a report: *What Work Requires of Schools: A SCANS Report for America 2000*. This report defines the know-how American students need for workplace success; and it specifically identifies five competencies, which, in conjunction with a three-part foundation of skills and personal qualities, lie at the heart of job performance today. As educators you are responsible for telling your students what the standards are – what is expected of them.

These eight areas represent essential preparation for all students, both those going directly to work after high school and those planning further education. Your most gifted students need this know-how, and so do those experiencing the greatest difficulties in the classroom. All eight skills must be an integral part of every young person's school life. In their letter to Parents, Employers and Educators, Secretary of Labor Lynn Martin and the members of the Commission say:

"We are convinced that if students are taught the know-how in the context of relevant problems, you will find them more attentive, more interested – indeed, more teachable – because they will find the coursework challenging and relevant."

— **What Work Requires of Schools**, June 1991

SCANS skills can and should be integrated into each subject in the core curriculum. The complete list of SCANS skills follows, as well as a chart that illustrates how each subject-matter area can be used to develop each competency. More information is contained in a 1993 SCANS report entitled, *Teaching the SCANS Competencies*, which can be obtained from the Region 4 School-to-Work office.

One of the best ways to actually experience SCANS skills in action (or acquire them!) is to do a 1 – 4 week summer worksite externship in a high performance business/industry that relates to your interests or subject area. Then use the contacts you've developed during the externship experience to secure a business mentor that can assist you during the school year to continue to bring real world applications of academic knowledge into your classroom. Finally, ask your host company to provide job shadow experiences or internships to your students who are exploring occupations in their business/industry cluster. Educator externship programs are available in your county; call the Region 4 School-to-Work office for a complete list.

Close the Loop – Provide Feedback.

Please help us make this Guide better.

We know that there are lots of good applications-based teaching and career-infused curriculum examples happening in our region every day. Help us find them and share successful project/problem-based, hands-on units with others. Are you using distance learning, the Internet or other technology to teach difficult concepts? Are you giving students work-based learning opportunities to increase the relevance of classroom instruction? Use the form at the back of the Guide to submit your own school-to-work lesson plan or unit. We'll pay $50 for any lesson/unit that is selected for publication in next year's Guide.

Secondly, please give us some feedback on the Guide itself. Have you taught any of the lessons? Has the Guide influenced your teaching? How can we improve the Guide? Feedback forms are included at the back of the book. Please copy as necessary.

Enhancing Your Lesson Plans

Use this design tool to plan an enhanced career/school-to-work lesson.

Curriculum Objective (s) – What Students Will Achieve:

_____

_____

The Career(s) or Workplace Environment Students Will be Exposed To:

_____

_____

What specific skills do you want students to learn or reinforce?

Define your basic project idea – What? Where? How?

What will students actually do?

Who else will be involved and how (business mentor, community member, other teacher, administrator, counselor, parent, older or younger students, etc. helping with design, implementation, evaluation)? How will others be prepared?

What resources or materials will you need? How will you access or obtain them?

What do you want to evaluate or assess? What specific methods or tools will you use to make the assessment authentic to evaluation in the real world?

Source: School & Main Institute, 1998

Assignments that Integrate the SCANS Competencies Into the Core Curriculum

	Curricukum Area				
Competency	**English/Writing**	**Mathematics**	**Science**	**Social Studies/ Geography**	**History**
Resources	Write a proposal for an after-school career lecture series that schedules speakers, coordinates audio-visual aids, and estimates costs	Develop a monthly family budget, taking into account expenses and revenues, and—using information form the budget plan—schedule a vacation trip that stays within the resources available	Plan the materials and time requirements for a chemistry experiment, to be performed over a two-day period, that demonstrates a natural process in terms of resource needs.	Design a chart of resource needs for a community of African Zulus. Analyze the reasons why major cities grew to their current size.	Study the Vietnam War, researching and making an oral presentation on the timing and logistics of transport of materials and troops to Vietnam and on the impact of the war on the Federal budget.
Interpersonal Skills	Discuss the pros and cons of the argument that Shakespeare's Merchant of Venice is a racist play and should be banned from the school curriculum.	Present the results of a survey to the class, and justify the use of specific statistics to analyze and represent the data.	Work in a group to design an experiment to analyze the lead content in the school's water. Teach the results to an elementary school class.	In front of a peer panel, debate whether to withdraw U.S. military support from Japan. Simulate urban planning exercise for Paris.	Study America's Constitution and roleplay negotiation of the wording of the free State/ slave States clause by different signers.
Information	Identify and abstract passages from a novel to support an assertation about the values of a key character.	Design and carry out a survey, analyzing data in a spreadsheet program using algebraic formulas. Develop table and graphic display to communicate results.	In an entrepreneurship project, present statistical data on a high-tech company's production/sales. Use computer to develop statistical charts.	Using numerical data and charts, develop and present conclusions about the effects of economic conditions on the quality of life in several countries.	Research and present papers on effect of Industrial Revolution on class structure in Britain, citing data sources used in drawing conclusions.
Systems	Develop a computer model that analyzes the motivation of Shakespeare's Hamlet. Plot the events that increase or decrease Hamlet's motivation to avenge the death of his father by killing Claudius.	Develop a system to monitor and correct the heating/ cooling process in a computer laboratory, using principles of statistical process control.	Build a model of human population growth that includes the impact of the amount of food available on birth and death rates, etc. Do the same for a growth model for insects.	Analyze the accumulation of capital in industrialized nations in systems terms (as a reinforcing process with stocks and flows).	Develop a model of the social forces that led to the American Revolution. Then explore the fit between that model and other revolutions.
Technology	Write an article showing the relationship between technology and the environment. Use word processing to write and edit papers after receiving teacher feedback.	Read manuals for several data-processing programs and write a memo recommending the best programs to handle a series of mathematical situations.	Calibrate a scale to weigh accurate portions of chemicals for an experiment. Trace the development of this technology from earliest uses to today.	Research and report on the development and functions of the seismograph and its role in earthquake prediction and detection.	Analyze the effects of wars on technological development. Use computer graphics to plot the relationship of the country's economic growth to periods of peace and war.

Source: Teaching the SCANS Competencies, Secretary's Commission on Achieving Necessary Skills, U.S. Department of Labor, 1993.

SCANS

Secretary's Commission on Achieving Necessary Skills

In 1991, the Secretary's Commission on Achieving Necessary Skills issued *What Work Requires of Schools: A SCANS Report for America 2000.*

The SCANS report included three major frameworks: (a) all U.S. high school students must develop a new set of competencies and foundation skills if they are to enjoy productive, full, and satisfying lives; (b) the qualities of high performance that characterize the most competitive companies must become the standard for the vast majority of all companies, large and small, local and global; and (c) the nation's schools must be transformed into high performance organizations in their own right. This report also categorized the competencies and other qualities needed for solid job performance. It described five competencies in which effective workers excel: (a) resources, (b) interpersonal skills, (c) information, (d) systems, and (e) technology. Also included in the report were the foundation skills and qualities that are prerequisites for competence. These skills included basic skills such as reading, writing, arithmetic, speaking, and listening. Thinking skills which cover decision making, solving problems, and reasoning were also cited. Personal qualities such as responsibility, self-esteem, and integrity were described as being necessary for solid job performance.

Competencies

The relevant SCANS competencies for each lesson in the Guide are indicated in the margin as SCANS.

Resources

Allocates Time

- Selects relevant, goal-related activities
- Ranks activities in order of importance
- Allocates time to activities
- Understands, prepares, and follows schedules

Allocates Money

- Uses or prepares budgets, including making cost and revenue forecasts
- Keeps detailed records to track budget performance
- Makes appropriate adjustments

Allocates Material and Facility Resources

- Acquires, stores, and distributes materials, supplies, parts, equipment, and space of final products in order to make the best use of them

Allocates Human Resources
- Assesses knowledge and skills and distributes work accordingly
- Evaluates performance and provides feedback

Interpersonal

Participates as a Member of a Team
- Works cooperatively with others and contributes to the group with ideas, suggestions, and effort

Teaches Others
- Helps others learn

Serves Clients/Customers
- Works and communicates with clients and customers to satisfy their expectations

Exercises Leadership
- Communicates thoughts, feelings, and ideas to justify a position
- Encourages, persuades, convinces, or otherwise motivates an individual or groups, including responsibly challenging existing procedures, policies, or authority

Negotiates
- Works toward an agreement that may involve exchanging specific resources or resolving divergent interests

Works with Cultural Diversity
- Works well with men and women and with a variety of ethnic, social, or educational backgrounds

Information

Acquires and Evaluates Information
- Identifies the need for data
- Obtains data from existing sources or creates needed data
- Evaluates the relevance and accuracy of the data

Organizes and Maintains Information
- Organizes, processes, and maintains written or computerized records and other forms of information in a systematic fashion

Interprets and Communicates Information
- Selects and analyzes information
- Communicates the results to others using oral, written, graphic, pictorial, or multimedia methods

Uses Computers to Process Information
- Employs computers to acquire, organize, analyze, and communicate information

Systems

Understands Systems

- Knows how social, organizational, and technological systems work and operates effectively within them

Monitors and Corrects Performance

- Distinguishes trends
- Predicts impact of actions on system operations
- Diagnose deviations in the function of a system/organization
- Takes necessary action to correct performance

Improves and Designs Systems

- Makes suggestions to modify existing systems to improve products or services
- Develops new or alternative systems

Technology

Selects Technology

- Judges which set of procedures, tools, or machines, including computers and their programs, will produce the desired results

Applies Technology to Task

- Understands the overall intent and the proper procedures for setting up and operating machines, including computers and their programming systems

Maintains and Troubleshoots Technology

- Prevents, identifies, or solves problems in machines, computers, and other technologies

Foundation Skills and Qualities

Basic Skills

Reading

- Locates, understands, and interprets written information in prose and documents—including manuals, graphs, and schedules—to perform tasks
- Learns from text by determining the main idea or essential message
- Identifies relevant details, facts, and specifications
- Infers or locates the meaning of unknown or technical vocabulary
- Judges the accuracy, appropriateness, style, and plausibility of reports, proposals, or theories of other writers

Writing

- Communicates thoughts, ideas, information, and messages in writing
- Records information completely and accurately
- Composes and creates documents such as letters, directions, manuals, reports, proposals, graphs, and flow charts
- Uses language, style, organization, and format appropriate to the subject matter, purpose, and audience
- Includes supporting documentation and attends to level of detail
- Checks, edits, and revises for correct information, appropriate emphasis, form, grammar, spelling, and punctuation

Arithmetic

- Performs basic computations
- Uses basic numerical concepts such as whole numbers and percentages in practical situations
- Makes reasonable estimates of arithmetic results without a calculator
- Uses tables, graphs, diagrams, and charts to obtain or convey quantitative information

Mathematics

- Approaches practical problems by choosing appropriately from a variety of mathematical techniques
- Uses quantitative data to construct logical explanations for real-world situations
- Expresses mathematical ideas and concepts orally and in writing
- Understands the role of chance in the occurrence and prediction of events

Listening

- Receives, attends to, interprets, and responds to verbal messages and other cues such as body language in ways that are appropriate to the purpose; for example, to comprehend, to learn, to critically evaluate, to appreciate, or to support the speaker

Speaking

- Organizes ideas and communicates oral messages appropriate to listeners and situations
- Participates in conversation, discussion, and group presentations
- Selects an appropriate medium for conveying a message
- Uses verbal language and other cues such as body language appropriate in style, tone, and level of complexity to the audience and the occasion
- Speaks clearly and communicates a message
- Understands and responds to listener feedback
- Asks questions when needed

Thinking Skills

Creative Thinking

- Uses imagination freely
- Combines ideas or information in new ways
- Makes connections between seemingly unrelated ideas
- Reshapes goals in ways that reveal new possibilities

Decision Making

- Specifies goals and constraints
- Generates alternatives
- Considers risks
- Evaluates alternatives
- Chooses best alternatives

Problem Solving

- Recognizes that a problem exists (i.e., there is a discrepancy between what is and what should or could be)
- Identifies possible reasons for the discrepancy
- Devises and implements a plan of action to resolve discrepancy
- Evaluates and monitors progress
- Revises plans as indicated by findings

Seeing Things in the Mind's Eye

■ Organizes and processes symbols, pictures, graphs, objects, or other information

For example, sees a building from a blueprint, a system's operation from schematics, the flow of work activities from narrative descriptions, or the taste of food from reading a recipe

Knowing How to Learn

■ Reshapes goals in ways that reveal new possibilities

■ Recognizes and can use learning techniques to apply and adapt new knowledge and skills in both familiar and changing situations

For example, is aware of learning tools such as personal learning styles (visual, aural, etc.); formal learning strategies (notetaking or clustering items that share some characteristics); and informal learning strategies (awareness of unidentified false assumptions that may lead to faulty conclusions)

Reasoning

■ Discovers a rule or principle underlying the relationships between two or more objects and applies it in solving a problem

For example, uses logic to draw conclusions from available information, extracts rules or principles from a set of objects or written text, applies rules and principles to a new situation, or determines which conclusions are correct when given a set of facts and a set of conclusions

Personal Qualities

Responsibility

■ Exerts a high level of effort and perseverance toward goal attainment

■ Works hard to become excellent at doing tasks by setting high standards, paying attention to details, working well, and displaying a high level of concentration even when assigned an unpleasant task

■ Displays high standards of attendance, punctuality, enthusiasm, vitality, and optimism in approaching and completing tasks

Self-Esteem

■ Believes in own self-worth and maintains a positive view of self

■ Demonstrates knowledge of own skills and abilities

■ Is aware of impact on others

■ Knows own emotional capacity and needs and how to address them

Sociability

■ Demonstrates understanding, friendliness, adaptability, empathy, and politeness in new and ongoing group settings

■ Asserts self in familiar and unfamiliar social situations

■ Relates well to others; responds appropriately as the situation requires

■ Takes an interest in what others say and do

Lesson Plan Matrix

by Grade Level and Subject

	Elementary School					Middle School					High School				
	Math	Social Studies	Science	Language Arts	Any Subject/Integrated	Math	Social Studies	Science	Language Arts	Any Subject/Integrated	Math	Social Studies	Science	Language Arts	Any Subject/Integrated
101 Bean Packing Company	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○
102 Buying a Car	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○
103 Career Interviewing Using AOL and the Internet	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●
104 Career Simulation	○	○	○	○	○	●	○	○	●	●	●	○	○	●	●
105 Create a Creature	○	○	○	●	○	○	○	○	●	○	○	○	○	●	○
106 Creating a Model Town	○	○	○	○	●	○	○	○	○	●	○	○	○	○	●
107 Evaluation of Careers That Require Math	●	○	○	○	○	●	○	○	○	○	●	○	○	○	○
108 Free Fall Explorations	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○
109 Freshman Survival Manual	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○
110 If I Were President	○	●	○	●	○	○	●	○	●	○	○	○	○	○	○
111 Is a Kiss Just a Kiss?	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○
112 Mock Interviewing	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●
113 Much Ado About Matrices	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○
114 The Mystery Boxes	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○
115 Occupation Observations	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○
116 Problem-Solving Scenarios	○	○	○	○	●	○	○	○	○	●	○	○	○	○	○
117 Recycle City	●	○	●	●	○	●	○	●	●	○	○	○	○	○	○
118 Rubber-Band Racer Quality Control	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○
119 Science Fair/Invention Fair/Ecology Fair	○	○	●	○	○	○	○	●	○	○	○	○	●	○	○
120 Seven Habits of Effective People	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●
121 Shake, Rattle and Roll	○	○	○	○	○	○	○	○	○	○	●	○	●	○	○
122 Spend a Million	●	○	○	○	●	●	○	○	○	●	●	○	○	○	●
123 Spoon Full of Sugar	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○
124 Stopping a Moving Vehicle	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○
125 Stress Balloon Production Company	○	○	○	○	●	○	○	○	○	●	○	○	○	○	○
126 Sub-Artic Survival	○	○	○	○	○	○	○	○	○	○	○	●	●	○	○
127 The Tallest Tower	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○
128 Total Quality Problem Solving	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●
129 Tower Team Building	○	○	○	○	●	○	○	○	○	●	○	○	○	○	○
130 Working Lines	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○

Key to Lesson Plan Icons

Grade Level

Elementary

Middle School

High School

Subject

Math

Social Studies

Science

Language Arts

Any Subject or
Integrated Subjects

Attachments

This lesson plan has
handouts or other
support materials.

Bean Packing Company

The Empirical Rule

Grade 11-12

Subject Area Mathematics (Statistics)

Overview This transfer activity is designed as a follow-up activity to "Is a Kiss Just a Kiss?" (lesson 111). Transfer activities are less directed than authentic learning tasks, allowing students to link what they have learned to a different context. This transfer plan allows students to explore their own possible solutions to a problem and test their solutions. The transfer addresses skills directly related to a work situation.

Time Allow two or three 50-minute class periods for the student activity. Allow one or two 50-minute periods for post-lab instruction and discussion.

SCANS Students gain opportunities to allocate human resources, participate as a member of a team, acquire and evaluate information, organize information, interpret and communicate information, use computers to process information, improve and design systems, and apply technology to a task. Students develop and reinforce basic skills such as reading, writing, math, listening, and speaking. Creative thinking, problem solving and reasoning skills are all a part of this project. Development of personal qualities such as responsibility and sociability are enhanced by this project.

Equipment None

Resources None

People None

Materials Gallon bucket of dry lima beans per group
20-25 plastic cups per group (12-16 oz.) to be used as bean packages
Other materials as requested by the students related to their methods of solving the problem

Costs Less than $30.00 per class of 20 students (four to five teams)

Contact This module was developed by Robert Chaney, Associate Professor of Mathematics, Sinclair Community College, 444 W. Third Street, Dayton, OH 45402-1460 and used in this handbook with his permission (E-mail: rchaney@sinclair.edu).

Procedures Divide class into work groups. Distribute *Empirical Rule* worksheets and instruct students accordingly.

BEAN PACKING COMPANY
THE EMPIRICAL RULE

Part 1

Problem Statement
Each group will set up a small company to package lima beans. Since "thousands" of packages will need to be filled each day, you will need to develop a system (or process) to do the job. This process must package the beans quickly and consistently. Quickly, because time is money, and consistently you want to produce a quality product for your customers.

Forming Your Company
Your company should consist of four or more people. Assign the following tasks:
1. Measurer. One student should be in charge of putting the beans into the packages.
2. Timer. A student who will time the process.
3. Charters. Students who will make the calculations and chart the information.
4. Counters. Every student in the group should help count the beans.

The Product
The name of your product is "A Handful of Beans". The first thing that you will need to determine is how many beans should go into each package. This will be answered below as you develop our packaging process.

Developing the Process
To fill packages with beans you will need a process or procedure. To start with let your process be simply to scoop out a handful of beans from the container and put in into a package (cup). Follow the steps below.

1. The Measurer will practice filling each cup with a handful of beans. Practice being quick and consistent. Time is money and consistency leads to quality. Determine what the best procedure is and keep doing it. Have the Measurer pretend he or she is a machine, repeating the same motions over and over. When the Measurer feels that he or she has determine the best procedure and is comfortable in doing it, then go to Step 2 below.

2. With all the cups empty, put them into the order in which they will be filled (the cups are numbered 1 through 15). The Measurer will fill the 15 cups with the same process that he or she practiced in Step 1.

3. Count the beans in each cup and record the data in the first column (BEANS/PACK) on the data sheet (use the BEAN COUNT TABLE in the appendix). Make sure to record the data in the order in which the cups were filled. Everyone should help count the beans.

4. What your company will consider a handful of beans will now be determined by finding the average in the BEANS/PACK column. You will also need to know the standard deviation, so use your calculators. Record this data at the bottom of the first column on your data sheet.

At this point you have a product and a process for producing it. You will now need to monitor this process to make sure that it is accurate and consistent (under control). A tool for doing this is called a Control Chart.

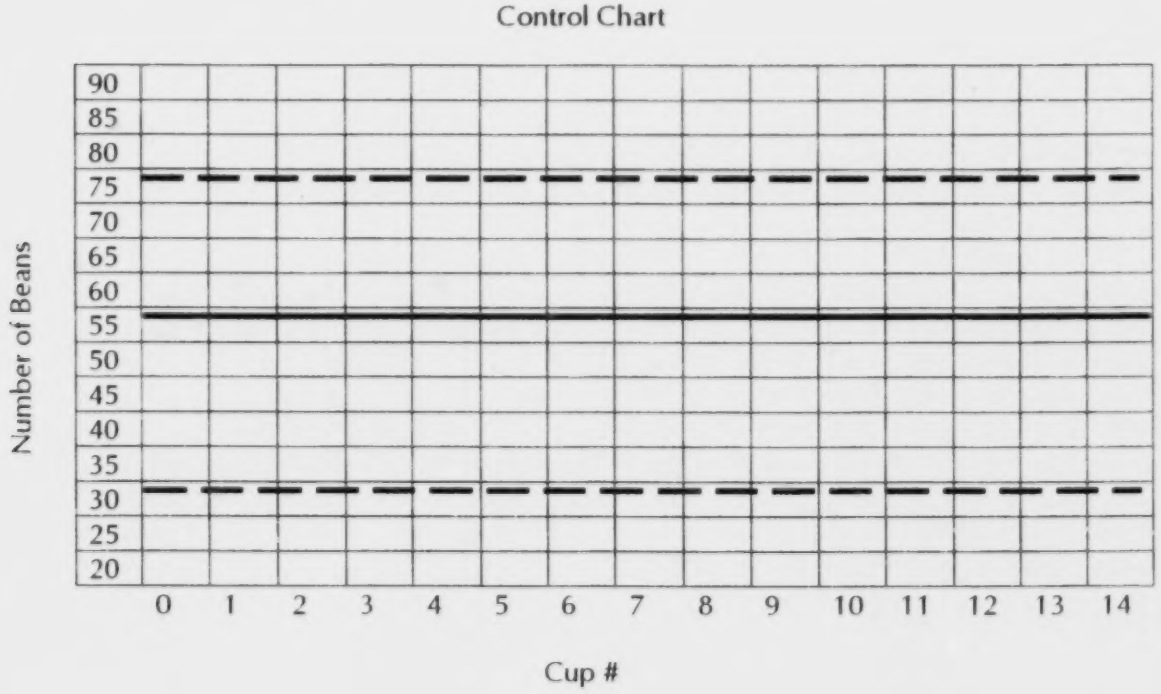
Making the Control Chart and Monitoring Your Process

Use the average and the standard deviation found at the bottom of the BEANS/PACK column to make your Control Chart. This Control Chart will help you monitor the variation in your process and make sure that you are averaging the number of beans you are claiming to be in each package. Follow the instructions below.

On your chart the numbers along the horizontal show the package number into which the beans were packed. The numbers on the vertical axis give the number of beans in the package.

On the vertical axis draw a solid horizontal line through the mean across the entire length of the sheet. Now, count three standard deviations up from the mean and three standard deviations down from the mean and draw dashed horizontal lines across the chart at these points. The dashed lines will be called your control limits.

Example: Suppose that the average number of beans is 53.7 and the standard deviation is 8.2 Your chart might then look like the following:



Follow the instructions below to see if your company's bean packaging process is in control.

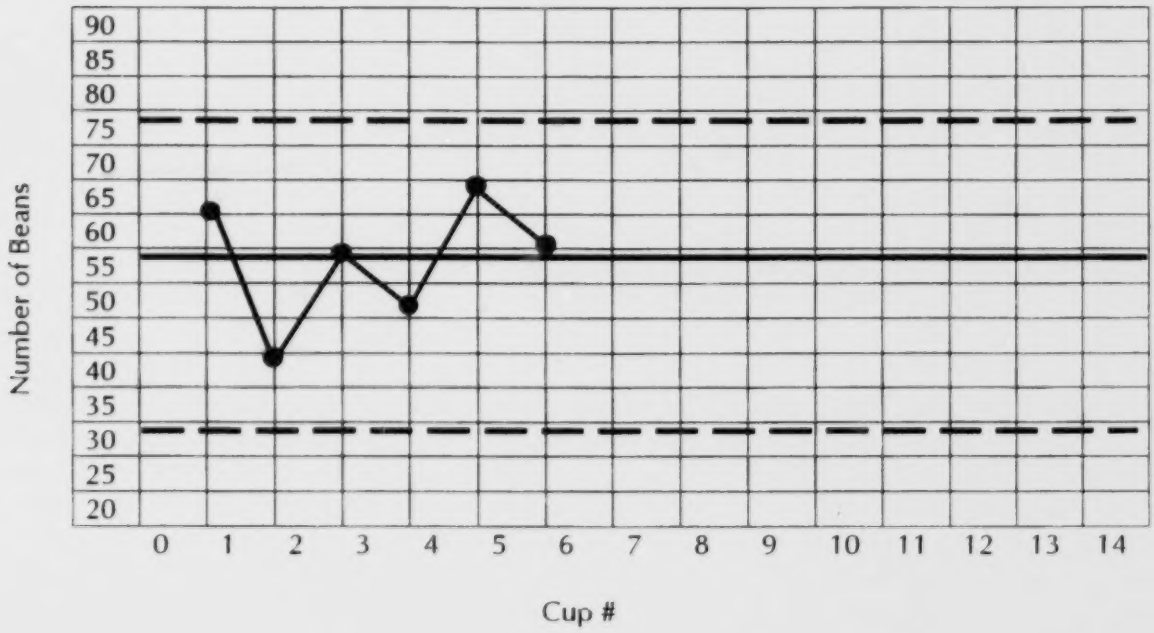
1. Once gain the Measurer fills 15 cups with a handful of beans using the same process as before. Remember, be as consistent as possible when scooping out a handful of beans and ill the containers in order (container #1, #2, etc.). The Timer will time how long it takes to fill 15 cups and record that information on the chart.

2. Everyone should help count the beans and the Charters should record the data in the Chart 1 column.

3. The Charters will take the data recorded in Chart 1 and plot it on the Control Chart.

Example: Suppose that the number of beans in the 1st cup is 65, the second cups is 44, the third cup is 58, 52, 67, 60, etc. Graph this data on your control chart as follows.

Control Chart



Is your process in Control?

Part 2 – Homework

1. Think about the variation in the number of beans between the packages (cups). What do you think are the causes of this variation?
2. Explain the reasoning behind the Control Chart. Why is it constructed the way it is? What does it show you?
3. Is your process in control? Why or why not?
4. Whether or not you found your process to be in control, you will still want to try and reduce the variation as much as possible. What possible change(s) in your packaging process could you make to accomplish this? Your product (average number of beans per package) has already been established and you can't change it. Your packaging department has already printed 5,000 containers.

Part 3 – Next Class Meeting

Improving the Process (Chart 2)
You have already determined what your company is calling a "Handful of Beans". You must stay with this amount. However, it is possible that you will want to improve your process. To produce a quality product, a process should be consistent (under control) and the variation should be minimized. Are there any changes that will make the process more stable (consistent), decrease the error (variation), and increase the number of packages that can be produced in a given time? If so, then the process should be modified based upon your recommendations. Given what is available (in the lab), can you produce a better product and keep your costs reasonable? Feel free to use whatever is at hand to help you. See if you can tighten your control limits (reduce the standard deviation) and still package the beans quickly.

Check to see if your modifications brought about the improvement. Using a different color pen, plot the data from Chart 2 onto the same Control Chart you used for Chart 1. In the same color, draw a solid line for your new mean and dashed lines for your new control limits. Identify this as Chart 2.

The Contract (Charts 3 & 4)
Bob's Soup Company wants to include packages of beans in their "Make You Own Soup" meals. At this time they are looking to contract another company to package the beans. Your company will want to compete for this contract. One of the things that Bob's Soup Company will initially want to see is some of your process control charts. If these look good, then you may get the contract.

For the data in Charts 3 & 4 use a new Control Chart grid, two colors and identify each chart.

The Final Report. In this report you will explain what you did in this activity.

1. Describe your processes and the changes you made in them. Include your BEAN COUNT TABLE from the appendix and the Control Charts.

2. What are the differences between "natural" variation and variation due to "assignable causes"?

3. How are the control charts used to monitor variation and distinguish between the two causes?

4. What errors in distinguishing between these two causes of variation need to be avoided?

5. How does the empirical rule apply to these control charts? Where is the normal distribution?

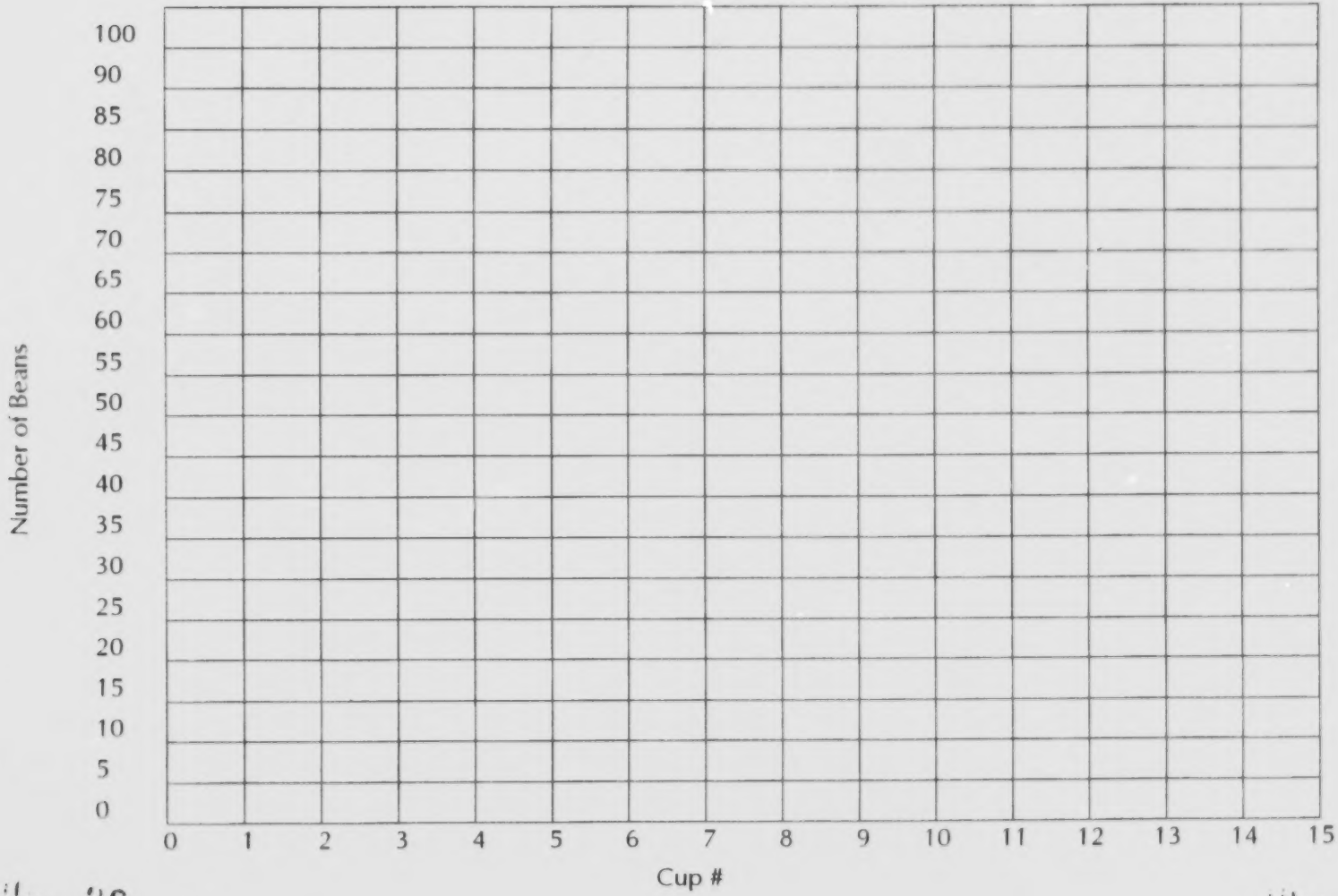
6. How does what you learned in this activity help you understand quality issues in manufacturing?

7. Explain how variation, consistency, and quality are related.

BEAN COUNT TABLE

Beans/Pack	Chart 1 1st run. Plot this data on chart	Chart 2 Try to reduce Std. Dev. Plot data.	Chart 3 Try to reduce Std. Dev. Plot data.	Chart 4 Try to reduce Std. Dev. Plot data.
1 _____	1 _____	1 _____	1 _____	1 _____
2 _____	2 _____	2 _____	2 _____	2 _____
3 _____	3 _____	3 _____	3 _____	3 _____
4 _____	4 _____	4 _____	4 _____	4 _____
5 _____	5 _____	5 _____	5 _____	5 _____
6 _____	6 _____	6 _____	6 _____	6 _____
7 _____	7 _____	7 _____	7 _____	7 _____
8 _____	8 _____	8 _____	8 _____	8 _____
9 _____	9 _____	9 _____	9 _____	9 _____
10 _____	10 _____	10 _____	10 _____	10 _____
11 _____	11 _____	11 _____	11 _____	11 _____
12 _____	12 _____	12 _____	12 _____	12 _____
13 _____	13 _____	13 _____	13 _____	13 _____
14 _____	14 _____	14 _____	14 _____	14 _____
15 _____	15 _____	15 _____	15 _____	15 _____
		Mean _____	Mean _____	Mean _____
		S = _____	S = _____	S = _____
		Time _____	Time _____	Time _____

Control Chart



101-8

Buying a Car

Grade 11-12

Subject Area Language Arts

Overview Students will use research to find information for making a decision and for writing a persuasive paper.

Time In-class time two to three days (50-minute periods); Outside class: two weeks

SCANS Allocates time, acquires and evaluates information, organizes and maintains information, interprets and communicates information, selects technology, all reading skills, all writing skills, decision making, reasoning

Equipment None

Resources None

People Librarian

Materials Magazines
Internet
Brochures
Newspaper articles
Newsbank
EBSCO
Other resources in school or public libraries

Costs None

Contact Georgia Dunn
Wilmington High School
300 Richardson Place
Wilmington, OH 45177
(937) 382-7716
(937) 382-1139

Procedures **Day One:** Discuss research and the different kinds of research that can be done: interviews, checking print and Internet materials, personal observations and testing, etc. Discuss reliable sources and those that are biased. If students have not used library resources, an introduction to the library resources would be good.

Procedures continued

Day Two: Ask the students how many of them own a car or would like to own a car. Discuss the kind of cars they own/drive and/or the kind of car they would like to drive. Discuss why they might want a certain car. Tell them that each student is to select three kinds of cars and research them. Discuss the areas that might be included in the research: mileage, comfort, looks, size, reliability, price, safety, resale, insurance costs, etc. Is the best source the salesperson at the local car dealership? Why or why not? Is the salesperson one of several sources?

Day Three: Let students use the sources available in the library, including books, magazines, computer searches using EBSCO and Newsbank on the Internet as well as Reader's Guide. Encourage them to interview owners of the kinds of cars they are interested in, if possible on their own time after school.

Day Four: Depending on the group, the research phase may take two or three days. After the students have gathered their research, they are to decide which of the three cars would be the best one for them to buy, based upon the information they have obtained.

Day Five: Each student is to prepare a report describing the three cars and explaining why the car they have chosen would be the best one for him or her. Depending upon the group, you may give them time for all drafting and final copies to be done in class or it may become an out-of-class assignment.

Note: This assignment would work well with at-risk students as well as very high achieving students. They are almost all interested in cars and all need the experience in argumentative writing based upon research.

Career Interviewing Using AOL and the Internet

H

All

Grade 9-12

Subject Area Any

Overview This activity involves students in interviewing people about their job to gain career information and direction.

Time Two 50-minute periods

SCANS Acquires and evaluates information
Organizes and maintains information
Interprets and communicates information
Uses computers to process information
Reading and writing
Reasoning
Responsibility

Equipment Computers for each student or student team

Resources America Online or other Internet service
Internet access and handouts

People None other than teacher and students

Materials None

Costs Cost of Internet access

Contact Nancy Brown
Fairmont High School
3301 Shroyer Road
Kettering, OH 45429
(937) 296-77011

Career Interviewing Using AOL and the Internet, continued

Procedures *Note: Be sure students use code names on their letters to insure student privacy and safety.*

Objectives:

- Improve communication skills
- Enhance questioning skills
- Discover how to interact more effectively with adults and people from the business community
- Broaden awareness of career options
- Learn why people skills, communication skills and networking skills can help you succeed in your career

Anticipatory Set:

With players sitting in a circle, pass around an object such as a key. Whoever holds it last becomes the storyteller. He or she starts the story, saying for example, "One night I heard a loud thud. When I looked out the window, I saw..."

Ask students to list the communication skills practiced in this exercise. Discuss how those skills are important in all types of communication including talking to people and interviewing for information.

One of the most critical skills that you can develop is the ability to talk to people you don't know. This can be a very difficult task for young people. All contacts and relationships begin with an initial conversation. This conversation will help you develop a relationship. These relationships can in turn impact your life.

To be able to talk to someone and ask intelligent questions gives you the edge over your peers. Adults are in the position to give you information to help you in career exploration and planning for college and work.

The next two days you will be contacting someone in a career of interest to you over the Internet and be asking them questions about their career and their life that can help you make a more informed decision about your career direction.

Steps to follow:

1. Prepare a letter asking for the interview and about 15 questions of interest to you concerning a career of interest. (Refer to sample letter handout and sample questions handout).
2. Access the member directory for AOL or the Internet provider you are using. Under status (profile), type in occupation. You may have to try different words or subcategories.
3. Locate at least two members.
4. If online, send an Instant Message, which is your letter to ask if the member would like to participate in your interview.

Career Interviewing Using AOL and the Internet, continued

Procedures continued

5. If they accept immediately, set up a time and date or do it. If they decline find someone else.
6. While in the Instant Message or Private Room mode, begin the interviews.
7. When done with the interview, highlight the text, and save, and/or print.
8. After completing your interviews, write a one page summary of what you have learned about the career from the interview.

SAMPLE QUESTIONS

1. How long have you been a _____?
2. Have you worked in any other related field?
3. Why did you choose _____ for a career?
4. What school or training have you had to become a _____?
5. How long did your schooling take?
6. Are you a boss?
7. What personal skills or personality traits are vital or helpful to your job?
8. Do you work mostly indoors or outdoors?
9. Would you say you acquired your skills at school or really just acquired them when you began your job?
10. How did you choose the career you're in?
11. How have your goals changed since the beginning of your career?
12. Is there anything that you would have done differently in pursuing your career?
13. What changes have you seen in your field over the years?
14. What would you say is the future outlook in your career?
15. What are your personal future aspirations?
16. What do you like about your job?
17. What do you dislike about your job?
18. What are the steps of the career ladder in this career area?
19. What are the responsibilities, job requirements, and benefits of this job?
20. How does this career impact the personal and family lives of the employees?
21. What does the company or employer do to support the employees as family members?
22. What is the pattern for advancement in this career area?
23. What does your employer consider when recommending someone for career advancement?
24. What are the rules of etiquette in this work setting?
25. What does the employer see as the role of leadership in achieving success in this work setting?
26. What is the hierarchy of this company?
27. How are decisions made?
28. Who has an impact on the future of the company?
29. If you could be in a different business, what would it be?
30. How many hours a week do you work?
31. Do you work on weekends?

Procedures continued

32. What are some of the specific things you need to know to do this job?
33. Do you think people skills are important to your job? Why?
34. What is the best way for me to develop those skills?
35. If you could be a teenager again, what would you do differently?
36. Besides your education, what makes you successful?
37. Are you involved in community service?
38. Do you belong to any professional organizations?
39. Who is your role model and why?
40. If you could give me one piece of career advice that you thought could really help me, what would it be?

SAMPLE LETTER

Dear member:

I am a high school student in Ohio and hope to be a future geologist. Would you be willing to let me interview you about your job? If you are free at (time and date) I will contact you then for a chat.

Although I've done research on geology, I feel that talking to a person in the field would tell me so much more than I can learn from books. I hope that you are free (time and date) so I can ask you a few questions.

Thank you for your time and consideration.

Your truly,

Code Name

Career Simulation

104

Grade 8-10

Subject Area Language Arts, Math, or other areas

Overview Students will experience the procedure of exploring a career and then pursuing a position in a career field.

Time 4-5 weeks; 50-minute time periods

SCANS Allocates time, allocates money, acquires and evaluates information, uses computers to process information, selects technology, basic skills, and decision making

Equipment Computers and overhead projector (both optional)

Resources None

People Junior Achievement or other community speakers (OWE/OWA coordinators) are optional.

Materials Career information such as COIN computer program
Occupational Outlook Handbook or Chronicle Guidance
Newspapers
Actual job applications from local businesses,
Minor labor laws
Individual Career Passports (ICP) folders
Telephone books

Costs None

Contact Georgia Dunn
Wilmington High School
300 Richardson Place
Wilmington, OH 45177
(937) 382-7716
(937) 382-1139 FAX

Procedures

Day One: Begin with asking students how they answer adults when they ask, "What do you want to be when you grow up?" After a few minutes of discussion, ask them how many have really thought of what they want to do in five, four, or three years (depending on age of students). Discuss the importance of making at least some general decisions now in order to take full advantage of their high school years (i.e., career center, college preparatory classes, vocational education, etc.). If using a computer program such as COIN, introduce class to the procedure for using the interest survey on the computer. If using career information books or folders, find a career interest survey (some are associated with the ICP folders). If time, have students take the career interest survey, which will give them some possible career clusters or specific job ideas.

Day Two to Four (depending on the class): Students should complete the interest survey if not finished in the first day. Hand out career information questions for research. Students are to pick three of the jobs, which they found as a result of the interest survey and research the careers using research material/ computer programs. They are to answer each of the questions about the careers. If information is unavailable for a particular career, they may write "unavailable," but only after checking to be sure that the information is not available in another research area.

Day Five and Six: Discuss the career report. Each student is to pick his/her favorite of the three careers that he/she researched. Depending upon the need of the class you may give them a strict guideline for summarizing and paraphrasing the information they found or you may simply ask them to write a report using the questionnaire information. Drafting should occur on these two days. The final copy may be completed outside class and turned in at a later date appropriate to the class doing the work.

Day Seven: Ask students to share the name of their favorite career and why it was their favorite career. Hand out the interview sheet. Discuss how to find someone who is currently employed in the job each student finds most interesting. Make the assignment due at an appropriate time for the group with which you are working.

Day Eight: Discuss the job-related terms that students need to know in order to be informed in the work place. (See attached.) You may use transparencies to first find student knowledge and then define the terms on the overhead. These terms will be used throughout the rest of the unit.

Day Nine: Discuss job applications and the kind of information that students need to know to complete applications. Hand out the personal data sheets. Use the overhead to go over each part of the data sheet. Have telephone books on hand to look up addresses and phone numbers for employees and references.

Procedures continued

Day Ten: Complete yesterday's assignment if necessary. Then, using the overhead, discuss and fill out an application together (each students completing his/her own).

Day Eleven: Complete the application from yesterday if needed. Then review the business letter form. Discuss a letter of application and what needs to be included in such a letter. Depending upon the group, you may want to give them a sample letter of application.

Day Twelve: Using newspapers (ask colleagues to save the two previous Sundays' classified sections or ask students to bring one), students are to search the want ads to find a job that they would be interested in having in the future. (They may want to choose one of the three jobs they previously researched.) Using the information from the want ad and making up additional information that might be necessary, students are to write a letter of application for the job in the paper.

Day Thirteen: Students should continue drafting their letters of application and write the final copy to submit for a grade.

Day Fourteen: Hand out generic applications and tell the students they have received these from their prospective employers as a result of the letter of application that they wrote. Remind them that an average application doesn't always get a person a job. It must be better than average; therefore, in order to get a job in this classroom, each student must receive at least a B on the assignment or he/she will continue completing applications until the B is attained.

Day Fifteen: Assume for the time being that everyone has achieved at least a B on the application and has a job. Based upon the salary for that job, each student is to complete a budget sheet. Discuss the items on the budget sheet and discuss any additional items which might need to be included (cell phones, beepers, etc.). (Students who do not receive a B will need to be given additional opportunities throughout the unit to complete an application until they do. Put the grade in pencil in the grade book and change it later.)

Day Sixteen: Using the newspapers, students are to choose living quarters (house or apartment), a car, furniture, etc. This will be a very active assignment. Students may want to have roommates, etc. They will need help in figuring taxes, insurance, the cost of utilities, etc. Depending upon the group, you may want to make this a take-home assignment to be discussed with parents for a reality check, or merely complete it during class discussion of the cost of groceries, telephones, cable television, entertainment, clothing, etc. It often takes more than a day to do this, but most of the time the students are very involved in the process.

Procedures continued

Day Seventeen: Depending upon the age of the students, some will be looking for employment soon. This is a perfect time to explain the minor labor laws to them. (And perhaps to yourself!) The latest laws are available from the state or from the OWE or Work-Study coordinator in your school. In addition, find out the procedure for students in your district to obtain an age and schooling certificate, commonly known as a work permit, and explain the procedure to the students.

Day Eighteen: This is a review day. Have the students engage in cooperative learning exercise or any other type of review that you have used successfully to prepare them for a teacher-made test over the unit.

Day Nineteen: Have students complete the career unit teacher-made test which includes an application. (This may allow some students who still haven't achieved a B to receive it.)

Day Twenty: Depending upon the grade level of the group, this is a good time for the eighth-grade students to complete the first part of their ICP folders since they have completed several of the assignments in the folder. If the students are ninth graders, it is a good time to update and revise the folder and to add the ninth-grade classes, etc. to the folder. If the students are tenth graders, updating is still important.

Notes: I have used this simulation quite successfully with ninth-grade at-risk students. Some of these groups, however, have needed more time to complete the assignments. However, it is important to keep things moving in order to keep the students engaged. Students with a more academic approach to learning may be able to complete the assignments in much less time.

ADDITIONAL ACTIVITIES:

Speakers from the world of work might fit or be used well in this unit. I found that the students were so diverse in their interest that they didn't really need outside stimuli for their interest. In my ninth-grade at-risk class, we culminated the study with a field trip to the career center which is located off campus. Each student visited two of the programs of their choice and had an opportunity for hands-on experiences in each of the programs. If this unit is used with sophomores, I would include resumes and mock interviews with the activities. Outside speakers would be particularly helpful with the mock interview process.

Credit "Voices of Experience" from *Scholastic Scope* magazine; applications from local businesses

CAREER INTEREST SURVEY

Questions to ask yourself when thinking about a career (Answer each of the following questions in two to four complete sentences.)

1. What type of work environment would you like? (inside, outside, office, factory, by yourself, with people, alone, physical labor, mental work)

2. What type of daily activities, responsibilities and special projects would you like to perform? (repeat the same thing, do different things, have responsibility for other people, only be responsible for yourself, be the boss, take orders, etc.)

3. How much schooling are you willing to do in order to get a job? (high school, some college, 4 years of college, technical school, training, etc.)

4. What jobs do people you know have that you might like to have? What jobs do people have that you know you would not like to have?

5. If you had to pick a career right now, list the top jobs you would want to have.

   1.

   2.

   3.

   4.

   5.

CAREER RESEARCH

Name _____

1. Name of occupation _____

2. What kind of work is performed in this occupation? _____

_____

3. What are the working conditions for this job? _____ ___.

_____

4. What kind of hours does a person in this job work? _____

5. What are the earnings for a person just beginning in this job? _____

What are the earnings for someone with experience? _____ What fringe benefits will this job provide? _____

6. What kind of education is required to get this job? _____

What training (if any) is required for this job? _____

7. What courses should a person take in high school to prepare for this job? _____

_____

8. Are there other things that might be helpful? _____

_____

9. What licenses or special requirements are needed? _____

Do people in this job join a union? _____

10. What should you be able to do to perform this job? _____

_____

11. What social or psychological factors might attract a person in this job? _____

_____

12. Where do most people in this profession work? _____

13. What are the opportunities for getting a job in this profession in the future? _____

_____

14. How can a person get into this profession? _____

_____

15. What opportunities are there for advancement in this job? _____

_____

16. What are some related occupations? _____

_____

17. Where did you find the information on this job? _____

YOUR OPINION

18. What are some of the bad things about this occupation? _____

_____

19. What are some of the good things about this occupation? _____

_____

20. Now that you have researched this job, do you think it is something that you might want to do in the future? Why or why not? _____

_____

_____

_____

INTERVIEW QUESTIONS

Create your own interview questions. Here are some sample questions.

How did you get interested in your kind of work?

How did you prepare for this career (special courses? on-the-job training? vocational school? college? apprenticeships?)

What special interests or skills do you need for your job?

What school subjects were most useful to you?

What do you like most about your work?

What do you like least about your work?

Do you see yourself in this field 10 or 20 years from now? If yes, in what capacity?

If no, why not?

How does this kind of work support the lifestyle you desire (money, work hours, benefits, leisure time, overtime, etc.)?

What are some different job you've had? Were they helpful in directing you to your present position? If so, how?

Do you have any advice for someone interested in entering your field?

CAREER REPORT

Now that you have finished your research about careers, you are going to write a six-paragraph report about the career. Using your career report questionaire, follow this format for writing your report.

First paragraph: In this paragraph, tell the name of the job. Tell what a person who does this job does.

Second paragraph: In this paragraph, include the working conditions, hours, and earnings of a person doing this job.

Third paragraph: In this paragraph, include the education, training, high school courses, licenses, professional organizations, and unions tbat are involved with this career.

Fourth paragraph: This paragraph should include the personal qualifications, social and psychological factors, and where most of these people work.

Fifth paragraph: This paragraph tells how a person can get into this profession, what opportunities there are for advancement, and related occupations.

Sixth paragraph: In this paragraph, tell what you think are the good points of the job and what you think are the bad points. Then tell whether or not you think you would like the job and why or why not.

Career report		
Six paragraphs		
first paragraph	10	
second paragraph	10	
third paragraph	10	
fourth paragraph	10	
fifth paragraph	10	
sixth paragraph	10	Total (60) _____
Grammar		
punctuation	10	
capitalization	10	
run-on/fragment free	10	Total (30) _____
Others		
report makes sense	5	
done in pen or typed	5	Total (10) _____

Grand total (100) _____/100

CAREER TERMS

1. social security number
2. fringe benefits
3. gross pay
4. net pay
5. retirement
6. income tax
7. minor labor laws
8. age & schooling certificate
9. minors
10. application
11. Chronicle Guidance
12. personal data sheet
13. deductions
14. interview
15. miminum wage
16. salary
17. hourly wage
18. high school diploma
19. N/A
20. reference
21. referred by
22. resume
23. labor union

PERSONAL DATA SHEET

I. Personal

Full Name _____
Last First Middle

Date of birth _____ Place of birth _____

Social Security # _____

Present address _____
Number and street

_____
City, State & Zip

Telephone _____
(area code)

List complete previous address if changed during the last five years:

_____

Occupational goal _____

_____

II. Educational background (list the most recent first)

Name of School Address Course of Study Dates

_____

_____

_____

List your school activities, offices held, and honors earned:

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

7. _____ 8. _____

Hobbies and activities outside school:

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

7. _____ 8. _____

III. Employment and volunteer experiences (list most recent first)

Name of employer	Address	Job	Dates	Reason left

IV. References (Don't use relatives or people below the age of 21!)

Name	Address	Telephone	Relationship

In case of emergency, contact:

Name _____

Address _____

Telephone _____ Relationship _____

APPLICATION INFORMATION

1. Always print all parts of the application (except the signature) in blue or black ink.
2. Always include the zip code even if it isn't asked for.
3. Address means number and street and city, state and zip.
4. Location means only city and state.
5. In your situation, your permanent address is the same as your present address, so you may write same.
6. A social security number has nine numbers (3-2-4).
7. Read everything carefully to be sure you're answering correctl.
8. Years attended means 1989-1990 (not a number).
9. At this point, for subject studied put "general".
10. Always include area code with phone number.
11. For date graduated, use N/A.
12. Use N/A only if the question doesn't apply to you or is related to a question you've already answered no.
13. On former employers and references, make two levels in the address spot so that you can fit the full address.
14. In general, every blank should be filled in.
15. You must have three references.
16. "Referred by" means how did you find out about this job.
17. Salary desired" may be answered several ways, but be careful. Sometimes a good answer is "minimum wage or "your scale".

Remember that some questions can't be asked unless they are definitely related to the job.

In today's job market, you can't get an interview unless you can correctly complete an application.

APPLICATION FOR EMPLOYMENT

(PRE-EMPLOYMENT QUESTIONNAIRE) (AN EQUAL OPPORTUNITY EMPLOYER)

PERSONAL INFORMATION

DATE

NAME _____ SOCIAL SECURITY NUMBER _____

LAST FIRST MIDDLE

PRESENT ADDRESS _____

STREET CITY STATE ZIP

PERMANENT ADDRESS _____

STREET CITY STATE ZIP

PHONE NO. ARE YOU 18 YEARS OR OLDER? Yes ☐ No ☐

ARE YOU PREVENTED FROM LAWFULLY BECOMING EMPLOYED IN THIS COUNTRY BECAUSE OF VISA OR IMMIGRATION STATUS? Yes ☐ _____ No ☐ _____

EMPLOYMENT DESIRED

POSITION DATE YOU CAN START SALARY DESIRED

ARE YOU EMPLOYED NOW? IF SO MAY WE INQUIRE OF YOUR PRESENT EMPLOYER?

EVER APPLIED TO THIS COMPANY BEFORE? WHERE? WHEN?

REFERRED BY

EDUCATION	NAME AND LOCATION OF SCHOOL	*NO OF YEARS ATTENDED	*DID YOU GRADUATE?	SUBJECTS STUDIED
GRAMMAR SCHOOL				
HIGH SCHOOL				
COLLEGE				
TRADE, BUSINESS OR CORRESPONDENCE SCHOOL				

GENERAL

SUBJECTS OF SPECIAL STUDY OR RESEARCH WORK

SPECIAL SKILLS

ACTIVITIES: (CIVIC, ATHLETIC, ETC.)

EXCLUDE ORGANIZATIONS, THE NAME OF WHICH INDICATES THE RACE, CREED, SEX, AGE, MARITAL STATUS, COLOR OR NATION OF ORIGIN OF ITS MEMBERS.

U.S. MILITARY OR NAVAL SERVICE RANK PRESENT MEMBERSHIP IN NATIONAL GUARD OR RESERVES

*This form has been revised to comply with the provisions of the Americans with Disabilities Act and the final regulations and interpretive guidance promulgated by the EEOC on July 26, 1991.

(CONTINUED ON OTHER SIDE)

LITHO IN U.S.A.

17

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FORMER EMPLOYERS (LIST BELOW LAST THREE EMPLOYERS, STARTING WITH LAST ONE FIRST).

DATE MONTH AND YEAR	NAME AND ADDRESS OF EMPLOYER	SALARY	POSITION	REASON FOR LEAVING
FROM				
TO				
FROM				
TO				
FROM				
TO				
FROM				
TO				

WHICH OF THESE JOBS DID YOU LIKE BEST?

WHAT DID YOU LIKE MOST ABOUT THIS JOB?

REFERENCES: GIVE THE NAMES OF THREE PERSONS NOT RELATED TO YOU, WHOM YOU HAVE KNOWN AT LEAST ONE YEAR.

	NAME	ADDRESS	BUSINESS	YEARS ACQUAINTED
1				
2				
3				

THE FOLLOWING STATEMENT APPLIES IN: MARYLAND & MASSACHUSETTS. (Fill in name of state)
IT IS UNLAWFUL IN THE STATE OF _____ TO REQUIRE OR ADMINISTER A LIE DETECTOR TEST AS A CONDITION OF EMPLOYMENT OR CONTINUED EMPLOYMENT. AN EMPLOYER WHO VIOLATES THIS LAW SHALL BE SUBJECT TO CRIMINAL PENALTIES AND CIVIL LIABILITY.

_____
Signature of Applicant

IN CASE OF EMERGENCY NOTIFY _____
NAME ADDRESS PHONE NO.

"I CERTIFY THAT ALL THE INFORMATION SUBMITTED BY ME ON THIS APPLICATION IS TRUE AND COMPLETE, AND I UNDERSTAND THAT IF ANY FALSE INFORMATION, OMISSIONS, OR MISREPRESENTATIONS ARE DISCOVERED, MY APPLICATION MAY BE REJECTED AND, IF I AM EMPLOYED, MY EMPLOYMENT MAY BE TERMINATED AT ANY TIME.
IN CONSIDERATION OF MY EMPLOYMENT, I AGREE TO CONFORM TO THE COMPANY'S RULES AND REGULATIONS, AND I AGREE THAT MY EMPLOYMENT AND COMPENSATION CAN BE TERMINATED, WITH OR WITHOUT CAUSE, AND WITH OR WITHOUT NOTICE, AT ANY TIME, AT EITHER MY OR THE COMPANY'S OPTION. I ALSO UNDERSTAND AND AGREE THAT THE TERMS AND CONDITIONS OF MY EMPLOYMENT MAY BE CHANGED, WITH OR WITHOUT CAUSE, AND WITH OR WITHOUT NOTICE, AT ANY TIME BY THE COMPANY. I UNDERSTAND THAT NO COMPANY REPRESENTATIVE, OTHER THAN IT'S PRESIDENT, AND THEN ONLY WHEN IN WRITING AND SIGNED BY THE PRESIDENT, HAS ANY AUTHORITY TO ENTER INTO ANY AGREEMENT FOR EMPLOYMENT FOR ANY SPECIFIC PERIOD OF TIME, OR TO MAKE ANY AGREEMENT CONTRARY TO THE FOREGOING."

DATE _____ SIGNATURE _____

DO NOT WRITE BELOW THIS LINE

INTERVIEWED BY _____ DATE _____

REMARKS _____

NEATNESS _____ ABILITY _____

HIRED ☐ Yes ☐ No POSITION _____ DEPT _____

SALARY/WAGE _____ DATE REPORTING TO WORK _____

APPROVED 1 _____ 2 _____ 3 _____
EMPLOYMENT MANAGER DEPT. HEAD GENERAL MANAGER

This form has been designed to strictly comply with State and Federal fair employment practice laws prohibiting employment discrimination. This Application for Employment Form is sold for general use throughout the United States. TOPS assumes no responsibility for the inclusion in said form of any question which, when asked by the Employer of the Job Applicant, may violate State and/or Federal Law.

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LETTER OF APPLICATION

1. Write an opening paragraph in which you make clear what position you want and how you learned about it.

2. Write a paragraph or two in which you state your qualifications, educational background (especially any classes, etc, which might help in the job), special abilities relevant to the job, and experience. Show how any experience you have had may have trained you for this job.

3. Add a paragraph in which you mention one, two, or three people who can comment on your character and working ability. Give their full names, positions, addresses, and telephone numbers. (Don't use a name without permission.)

4. Write a closing paragraph in which you request an interview at the employer's convenience. Give your phone number.

SAMPLE LETTER OF APPLICATION

300 Richardson Place
Wilmington, Ohio 45177
February 9, 1999

The Smith Company
1010 Main Street
Cincinnati, Ohio 45231

Dear Sir or Madam,

I am writing to apply for the job as secretary-typist which was advertised in the Dayton Daily News on February 2, 1999.

I have recently graduated from Wilmington High School with a B average in all of my classes. I took many courses in the business department and always received good grades. I type 65 words per minute with no mistakes. In addition, I did typing for teachers and worked as an office aide, which gave me experience in office procedures.

My typing teacher Mrs. Georgia Dunn can be contacted at Wilmington High School, 300 Richardson Place, Wilmington, Ohio 45177, or telephone (513) 382-7716. She will be glad to tell you about my office skills. Also my minister Peter Kimper will be happy to tell you about my character. He can be phoned at (513) 932-8886 or written at P.O. Box 92, Lebanon, Ohio 45036.

I look forward to an interview with you at your earliest convenience. Please call me at (513) 382-7716.

Sincerely,

Georgia S. Dunn

BUDGET SHEET

Name of employee _____

Job title _____ Monthly earnings _____

Lifestyle: Married _____ Single _____ Children _____ Roommate _____

Below are a list of expenses. Include how much you will spend on each one each month. If you leave one blank, you must explain why it is blank

Taxes (Federal [15%] State [5%] City [2%]) _____

Social Security (8%) _____

Housing (rent or house payment) _____

Heat & electricity _____

Water _____

Cable television _____

Furniture and appliances (tv, stereo, sofa, bed, etc) _____

Telephone (basic and long distance calls) _____

Car payment (list type and year of car) _____

Insurance (per month) _____

Gasoline and maintenance & license tags _____

Groceries _____

Medicine & doctor, health insurance _____

Clothing (shoes, jeans, underwear, etc) _____

Entertainment (include video rentals, movies, restaurants, concerts, dates, flowers, etc.) _____

Miscellaneous (include savings or payments of loans) _____

Total of monthly expenses _____

Monthly income _____

- expenses _____

Money left _____

OHIO Form III 3331.02 R.C. 4109.99 R.C.

PLEDGE OF EMPLOYER

SCHOOL DISTRICT

NAME OF MINOR

ADDRESS OF MINOR

EMPLOYER (FIRM NAME)

ADDRESS OF MINOR'S PLACE OF EMPLOYMENT | TELEPHONE NUMBER

SPECIFIC NATURE OF EMPLOYMENT

TO BE EMPLOYED

1 NO. DAYS PER WEEK	2 HOURS PER DAY	3 STARTING TIME	4 QUITTING TIME
5 TIME ALLOWED DAILY FOR LUNCH		6 STARTING TIME	7 QUITTING TIME

8 IF ITEMS 1 THROUGH 7 ARE NOT APPLICABLE, ARE IRREGULAR HOURS TO BE WORKED WITHIN THE LIMITS OF THE LAW? ☐ YES ☐ NO

THE UNDERSIGNED HEREBY AGREES TO EMPLOY THE ABOVE NAMED CHILD DURING THE WORKING PERIOD ABOVE SPECIFIED IN ACCORDANCE WITH LAWS REGULATING THE EMPLOYMENT OF MINORS.

THE EMPLOYMENT WILL BECOME EFFECTIVE AS SOON AS THE NECESSARY AGE AND SCHOOLING CERTIFICATE IS RECEIVED BY THE EMPLOYER. THE EMPLOYER AGREES TO PERMIT THE CHILD TO ATTEND PART-TIME SCHOOL WHEN SUCH IS AVAILABLE, AND TO RETURN THE AGE AND SCHOOLING CERTIFICATE TO THE ISSUING OFFICER WITHIN TWO DAYS AFTER THE EMPLOYMENT OF THE CHILD TERMINATES.

(SIGNATURE OF PERSON AUTHORIZED TO SIGN FOR EMPLOYER) | DATE

ADDRESS OF EMPLOYER | TELEPHONE NO.

Dayton Legal Blank Co., Form No. 26066

OHIO Form V 3331.02 R.C. 3331.06 R.C.

PHYSICIAN'S CERTIFICATE

SCHOOL DISTRICT

NOTE: IF WORK SHOULD BE LIMITED TO A CERTAIN TYPE OF EMPLOYMENT, THE PHYSICIAN MUST MAKE A STATEMENT ACCORDINGLY AND WRITE OR PRINT THE WORD "LIMITED" DIAGONALLY ACROSS THIS CARD

The undersigned hereby certifies that he has thoroughly examined _____ (NAME OF MINOR)

who was born on _____ (MONTH) _____ (DAY) _____ (YEAR), and who meets the description given hereon, and that said person ☐ is ☐ is not in his opinion physically fit to perform the work of any employment not forbidden by law to a person of his age and sex.

EMPLOYMENT SHOULD BE LIMITED TO WORK SPECIFIED BELOW

SEX	HEIGHT	WEIGHT	COLOR OF HAIR	COLOR OF EYES
☐ MALE ☐ FEMALE	FT IN	LBS		

DISTINGUISHING CHARACTERISTICS, IF ANY

(PHYSICIAN'S SIGNATURE) | 000 52 | (DATE)

Dayton Legal Blank Co., Form No. 26068

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OHIO Form IV 3331.02 R.C.

SCHOOL RECORD OF APPLICANT FOR EMPLOYMENT CERTIFICATE

SCHOOL DISTRICT

I certify that _____
(FULL NAME OF PUPIL)

who resides at _____
(EXACT ADDRESS)

whose age is _____ years and _____ months, attended school _____ days the current year, and _____ days last school year.

This pupil has successfully completed the _____ grade and is presently enrolled in the _____ grade.

This pupil ☐ is ☐ is not enrolled in the State Approved work program.

Comments:
(INCLUDING STANDING IN STUDIES AND RATING IN CONDUCT)

_____
(SIGNATURE OF PRINCIPAL)

_____
(NAME OF SCHOOL)

_____
(DATE)

OHIO Form II 3331.02 R.C.

APPLICATION FOR EMPLOYMENT CERTIFICATE

SCHOOL DISTRICT

NAME OF APPLICANT IN FULL

PROOF OF AGE (APPLICANT SHOULD PRESENT BIRTH CERTIFICATE WITH THIS CARD)
(TYPE OF DOCUMENT)

ADDRESS OF APPLICANT

DATE OF BIRTH	AGE	SEX	PRESENT GRADE IN SCHOOL OR HIGHEST GRADE COMPLETED

LOCAL SCHOOL DISTRICT

BUILDING

PARENT OR GUARDIAN | TELEPHONE NUMBER

ADDRESS OF PARENT OR GUARDIAN

I HEREBY CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THE ABOVE STATEMENTS ARE TRUE AND THAT THE MINOR NAMED ABOVE WILL WORK WITH MY APPROVAL

_____
(SIGNATURE OF PARENT OR GUARDIAN)

_____
(DATE SIGNED)

I HEREBY CERTIFY THAT I HAVE EXAMINED AND APPROVED THE ABOVE NOTED DOCUMENTARY PROOF OF AGE.

_____
(SUPERINTENDENT OR DESIGNATED ISSUING OFFICER)

_____
(NAME OF OFFICE)

_____
(ADDRESS OF OFFICE)

Create a Creature

105

E M H

Grade 6-12; works best if you have at least two classes who can complete the project and trade between classes.

Subject Area Language Arts

Overview Students will create a "creature" and then develop directions for recreating their creatures.

Time Two days and two more days one day later; 50 minutes per day (e.g. Mon., Tues., Thurs., and Fri.)

SCANS Communicates information, writing skills (#1, #2, #3, #4) Creative thinking, Seeing things in the mind's eye.

Equipment None

Resources None

People None

Materials Unlined white 8 1/2" x 11" paper, markers, colored pencils, or crayons.

Costs None

Contact Georgia Dunn
Wilmington High School
300 Richardson Place
Wilmington, OH 45177
(937) 382-7716
(937) 382-1139 FAX

Procedures **Day One:** Ask the students to think about creatures they have read about or seen on television or in the movies. Ask them if they have ever imagined a creature that they would find unusual, or funny, or scary or some of each. Hand out a plain piece of paper. Tell them that their assignment is to create a creature and then draw it. They may use pencil or pen, but should use colors also.

Note: Some students will be able to complete this quickly. Others may need more time and may need to complete the assignment at home. (Don't tell students that they will be writing directions regarding this creature or the creatures will become quite simple and mostly circles and squares.)

Procedures continued

Day Two: Each student is to look carefully at the creature that he or she has created and drawn. Then, after carefully examining the creature and remembering, the students are to write detailed descriptions of how to recreate that creature so that another person would be able to draw the creature based upon the instructions.

Day Three: Pick up assignments, including the steps it took to draw the creature and have another activity planned for the day. (I have shown a video tape of a half-hour show from the sci-fi channel.) Before the next day, code the descriptions and the drawings by class (e.g., use numbers in one class, using the same number for the matching drawing and description, and use letters in another).

Day Four: Without showing the class the drawings from the other classes, give each student the directions that another student has written and ask each student to draw the creature. You might want to offer a "prize" for those who do the best job of following the directions, decided by the class.

Day Five: Hold up the drawing made by the second student and read the directions that were given. Discuss whether or not the directions were followed as written. Then compare the second drawing to the original. Discuss how effective the written directions were and how they might have been improved. (Note: You might want to do this in small groups so that it takes less time. It will depend upon the size of the class.)

Note: If you don't have two classes, get a colleague to do the same assignment and switch between each others' classes or e-mail or snail-mail to another class in another school.

Creating a Model Town

106

E

M

H

All

Grade 4-12

Subject Area Technology, Math, Science, Environmental Science, Earth Science, Social Studies, and Language Arts

Overview After learning about land usage and the conservation of natural resources, students will plan and design a model town utilizing set parameters.

Time Two 50-minute periods for the explanation of the requirements of the project. This project should ideally follow a unit on natural resources and land use to give students the best benefit.

SCANS Resources, Interpersonal, and Information

Equipment Computers (not necessary, but helpful)

Resources Appropriate web sites on the Internet
Reference materials from the library.

People Zoning officials
Geologist
Hydro geologists
Contractors and developers
Environmentalists
Government officials

Materials Drawing materials (this is the teacher's choice)

Costs Minimal to none

Contact Mrs. Georgie Rosier
Ferguson Junior High School
2680 Dayton-Xenia Road
Beavercreek, OH 4534
(937) 429-7578

Procedures *Note: It is imperative that students receive a strong background in the subject areas noted above.*

1. Distribute first page of handouts and allow students to work.
2. After they complete the work on handout one, distribute handout two, and have them work individually to write a poem. Invite the Language Arts teacher to lead this lesson or do it in his/her classroom.

MODEL TOWN

Handout 1

Using what you have learned about land use and natural resources, you are going to plan a new town. You will draw a map of your town and write an explanation of why you chose to locate each item in the town where you did. You may work with a partner or alone, if you choose. Your town must include but is not limited to:

- At least one factory
- Some farmland
- Some park and recreational areas
- Schools
- At least one shopping mall
- Housing developments
- Roads
- Water treatment plan

Some things to keep in mind: Industries usually need to be near water, but locating industries near water runs the risk of polluting the water. If farmland is located too far from the town, the cost of transporting the goods is increased. There is also a potential for water pollution from farmland. Try to make the best use of your area while being concerned with pollution and the conservation of natural resources.

MODEL TOWN

Handout 2

For the center of your illustration . . .

CREATE

A poem following the pattern of your choice:

A "Biology Poem

Using the "bio" poem format which typically describes a person, write a description of the town you created instead.

Follow the pattern below:

Line 1: Your town name.
Line 2: Four adjectives which describe the town.
Line 3: Maintained by . . . (give name of organization).
Line 4: Home to . . . (name three inhabitants or organizations).
Line 5: Where . . . grow (name three plants).
Line 6: Which are threatened by . . .
Line 7: Which would benefit from . . . (name three things which would benefit the area).
Line 8: Town name.

An Acrostic

Using the name of your town (or the name of any plant, bird, or animal which inhabits the area) or the word QUALITY (as it pertains to water), write an acrostic poem:

Sample:

SISTER

She
Is always
Sharing her
Time with me.
Even though she's
Rather weird.

A "Concrete" Poem

Create a concrete or shape poem in which the arrangement of the letters and words add to the meaning of the poem.

Samples:

Evaluation of Careers That Require Math

E M H 107

Grade 4-12

Subject Area Math, Technology, Careers, Writing

Overview In this project students will be asked to identify 20 jobs and or careers and give a brief explanation of them. They will then identify what type(s) of math is (are) used in each.

Time This will vary depending on the students' ages and abilities. Two 50-minute class periods would probably be sufficient for the explanation. Additional class times could be used for guest speakers etc.

SCANS Interpersonal, Resources, and Information

Equipment Word processors would be beneficial for preparing the written reports, but not necessary.

Resources None

People Professional engineers, researchers, bankers, CEOs, contractors, architects, etc.

Materials Reference materials on careers
Films showing professionals during their daily efforts speakers

Costs None

Contact Mrs. Georgie Rosier
Ferguson Junior High School
2680 Dayton-Xenia Road
Beavercreek, OH 45434
(937) 429-7578

Procedures

1. During the first couple of class periods, spend some time illustrating examples of how math plays a major role in the numerous careers that exist in the professional world. Depending on your available time for this project, guest speakers could also be brought in to stimulate interest in this program.
2. Give students some time for interactions and brainstorming of ideas. This gives them added sources of information and helps to build good cooperation among your students.
3. Please look at the next page for further ideas.

CAREERS THAT REQUIRE MATH

The following project is worth 100 points. The project is due not later th n _____.
Any projects turned in before _____ will receive an extra 10 points. No projects will be accepted after _____.

The _____ project is to identify twenty (20) jobs and/or careers and give a brief)four to six sentences) explanation of the job, career, or field. For each, explain what type of math (algebra, geometry, trigonometry, etc.) is used in this career. All papers must be legible and neat or no credit will be received.

Format (*This format must be followed or you will not receive credit*).

Job:
Description: (Four to six sentences)
Type of Math Used:

NOTE:
Various types of the same job will only count as one (1) job. This means all engineers are one job, all teachers are one job, all doctors are one job. Each job is worth 1 point; each description is worth 2 points; and, the type of math used is 2 points.

Example:
Air Force Navigator
Job Description: Prior to a mission an Air Force Navigator computes flight plans, draws mission charts and figures flight duration. During the mission the navigator updates flight data and gives the pilots directional information. The navigator must analyze data given to him or her by numerous flight instruments and keep in-flight records on this data. After the flight the navigator must log all flight times.
Types of Math Used: Basic math, geometry, algebra.

Free Fall Explorations

H

108

Grade 9-12

Subject Area Physics or Physical Science

Overview This is a fun team project for the students. Students are not likely to get a job constructing free fall devices; however, the problem solving and teamwork skills involved in this project definitely transfer to the world of work.

Time Allow two or three 50-minute periods for students to explore, construct and test their projects. Some groups may choose to work outside class. Set aside one class period to test the projects for final evaluation.

SCANS Students gain opportunities to allocate time, allocate materials, allocate human resources, participate as a member of a team, exercise leadership, negotiate, acquire and evaluate information, interpret and communicate information, monitor and correct performance, improve and design systems, and troubleshoot. Students develop and reinforce basic skills such as reading , listening, and speaking. Creative thinking, problem solving and reasoning skills are all a part of this project. Development of personal qualities such as responsibility and sociability are enhanced by this project.

Equipment None

Resources None

People None

Materials

Maximum Used	*Minimum Used*
Two styrofoam cups	One styrofoam cup
Three pipe cleaners	One pipe cleaner
Four paper clips	One paper clip
Ten playing cards	Five playing cards
Three cupcake holders (paper)	Two cupcake holders (paper)
15 Q-tips	Five Q-tips
One paper plate	No paper plates

Costs $10-20 per class, depending on class size

Contact James Stevens, STW Physics Teacher
Northridge High School
2251 Timber Lane
Dayton, OH 45414

Procedures continued

Note to teacher: In order to obtain more accurate data for the free fall time the devices could be attached to "tap timers" before they are dropped. Students would then be able to plot a position-time graph for each model and a velocity time graph for each model.

Instructions for Students

Students will work in teams of three or four. Each team will be given two sets of identical parts with which to make two objects. One object should be as aerodynamic as possible. Think about cars, planes, and fish. One object is to be as air resistant as possible. Think about parachutes, paddle wheels, and oars.

Note: The paper plate may not be used in any way as a parachute. It may only be used (cut up) as support for your structure. You may use as much scotch tape as you need to attach parts but not as construction material itself. Also, you cannot use tape to increase the surface area of the device.

Testing: A 10-50 gram payload will be attached to each device. Each device will be dropped from a height of approximately 20-30 feet (6-10 meters) and its falling time will be timed with a stop watch.

Grading:

- Construction (creativity, craftsmanship, durability)
- Sketch of each model (not to scale but parts clearly labeled)
- Suggestion for additional useful parts or design improvement
- Falling time

A Freshman Survival Guide

Grade 11-12

Subject Area Language Arts (Cooperative learning group)

Overview Students will work in a group to draw from their own experiences and from interviews of freshman students to write a "survival manual' for incoming freshman.

Time Three days in class; 50-minutes per day, several more out of class

SCANS Allocates time, allocates material, participates as a member of team, exercises leadership, acquires and evaluates information, organizes and maintains information, interprets and communicates information, reading and writing skills, creative thinking, problem solving, sociability

Equipment None

Resources None

People Freshman English class meeting at the same time as the upper level English class

Materials "Writer's Workshop" worksheets would be helpful (see credit)

Costs None

Contact Georgia Dunn
Wilmington High School
300 Richardson Place
Wilmington, OH 45177
(937) 382-7716
(937) 382-1139 FAX

Procedures

Day One: Assign students to cooperative learning groups of no more than five students. Ask them to brainstorm all of the things they have learned about surviving high school since they entered the building as freshman two or three years ago. Discuss among themselves incidents, problems, or questions they had as a freshman that they would be able to answer, avoid, or solve now. After 10-15 minutes of brainstorming, tell them that the group's assignment is to create a manual for incoming freshmen that will help them to better adjust to the high school experience. They may divide it into sections concerning different areas of the experience or organize it in any way they would like, but each member of the group must add a component of the final project. Hand out the worksheet (copyrighted, see credit) and have members interview at least one freshman each in order to gain information for the project. Students may do this on their own outside class or through an exchange with a freshman English class meeting at the same time.

Day Two: Give the groups time to meet again to finalize the plan and gather necessary information in order for each member of the group to complete his/her assignment.

Days Three-Five: Give the groups 10-15 minutes each day to check progress, answer and ask questions, rearrange, and alter assignments.

Day Six: The groups should convene to put together the final product from the pieces that each group member has contributed. These may be drawings, writings of advice, anecdotes, or whatever the students have decided to include in their manual. Depending upon the group, you may ask that these be typed for final submission.

Day Seven or whenever manuals are due: Take the period to trade manuals among the groups and, using a rubric provided by the teacher (see attached) or one that the class has previously developed, rate the manuals. In addition, have each member of the cooperative learning group use a rubric to rate him/herself and all other members of the group on teamwork, responsibility, and follow-through.

Note: If at all possible, have some freshman students read the manuals and comment about the information included as well as the tone of the writing.

Credit

This assignment was adapted from a "Writer's Workshop" assignment in McDougal-Littell's *Literature and Language—Grade 11*.

FRESHMAN SURVIVAL GUIDE RUBRIC

Rating scale: 1=poor 2=weak 3=average 4=good 5=excellent
(Suggested grading weights are given for each section to total 100%.)

	Rating				
	Low				High
Content	1	2	3	4	5
1. The introduction clearly states the manual's purpose.	___	___	___	___	___
2. Ideas and explanations are informative, well-organized, and helpful.	___	___	___	___	___
3. Facts, examples, and anecdotes are lively and interesting; they add to explanations of student life.	___	___	___	___	___
4. All unfamiliar terms are clearly explained.	___	___	___	___	___
Subtotal _____ x 3 = _____					
Style					
5. The style of writing is varied, with an interesting combination of advice and list of rules.	___	___	___	___	___
6. The tone is clear and consistent.	___	___	___	___	___
Subtotal _____ x 2 = _____					
Usage and Mechanics					
7. Errors in the use of commas and semicolons are avoided.	___	___	___	___	___
8. Errors in spelling are avoided.	___	___	___	___	___
9. Errors in punctuation and capitalization are avoided.	___	___	___	___	___
10. The paper is legible and in correct manuscript form.	___	___	___	___	___
Subtotal _____ x 1 = _____					

Total Score = _____% Assignment Grade = _____

If I Were President

Grade 4-8

Subject Area Social Studies, Language Arts

Overview Groups of students pretend they are the President of the United States and identify and try to solve current issues. They identify people to use as consultants, look at the impact of their decision and make a panel report to their class.

Time Five days (one class period per day)

SCANS Resources, Interpersonal, Information, Technology, Basic Skills, Problem Solving, Thinking Skills, and Personal Qualities

Equipment Computer (optional)

Resources School library, newspapers, television political shows, such as C-Span

People School librarian

Materials Notebook paper, pens, markers, and crepe paper

Costs None

Contact Cynthia Jackson
4612 Vanguard Avenue
Dayton, Ohio 45418

Procedures

Day One

Divide the students into groups of three. Each group is to imagine that they are the President of the United States. The students are to think of some issues that are problems for our country and then write how they would solve those problems. Newspapers are provided for the students who need help in choosing issues. Ask each group to decided which of the cabinet members or people on the President's staff should be consulted in solving the problem. Also ask them to include the people in the government and in the county who will be affected by this decision.

Day Two

The issues have been chosen. Groups work to write a draft of their papers. Have groups exchange their finished drafts and edit them, making helpful suggestions for the other group.

Is a Kiss Just a Kiss?

The Normal Distribution

Grade 11-12

Subject Area Mathematics (Statistics)

Overview It is suggested that this authentic learning be completed by students at or near the beginning of a unit on statistics. A goal of the activity is to introduce the novice student to a practical situation requiring data analysis in a hands-on setting. Another goal is to provide students with experiences which will be linked to future instruction on data analysis.

Time Allow two or three 50-minute class periods for the student activity. Allow one 50-minute period for post-lab instruction and discussion.

SCANS Students gain opportunities to allocate human resources, participate as a member of a team, acquire and evaluate information, organize information, interpret and communicate information, use computers to process information, improve and design systems, and apply technology to a task. Students develop and reinforce basic skills such as reading, writing, math, listening, and speaking. Creative thinking, problem solving and reasoning skills are all a part of this project. Development of personal qualities such as responsibility and sociability are enhanced by this project.

Equipment None

Resources None

People None

Materials One 12-16 ounce bag of Hershey kisses per team at approximately $3.00 each

Costs One 12-16 ounce bag of Hershey kisses per team at approximately $3.00 each

Contact This module was developed by Robert Chaney, Associate Professor of Mathematics, Sinclair Community College, 444 W. Third Street, Dayton, OH 45402-1460 and used in this handbok with his permission (E-mail: rchaney@sinclair.edu)

Procedures Each team is to be given one bag of Hershey Kisses and instructed to complete the *Normal Distribution* assignment.

IS A KISS JUST A KISS?
THE NORMAL DISTRIBUTION

Part 1 Data Collection

Each Kiss® in your bag should be weighed and the weight (actually "the mass" since the units will be grams) recorded on the HERSHEY KISSES® DATA SHEET. Take turns so that each person in the group has a chance to weigh some of the Kisses®. Make sure everyone records all the data on their own data sheet. Also record the amount of chocolate (in grams) that Hershey is claiming to be giving you in each bag.

Part 2 Data Summarization And Analysis

Using your HERSHEY KISSES® DATA SHEET, answer the following questions:

a) What is the Mean? (You may want to use your calculator).
b) In general, each Kiss® is approximately how many grams of chocolate?
c) What is the Range? Are you surprised at this? Why or why not?
d) What could be some reasons for this large of a range?
e) How many Kisses® were there in the bag?
f) Based on Hershey's claim, approximately how many Kisses® too many or too few are there in each bag?

Construct a histogram for this data. Use at least 8-10 non-overlapping classes and be as neat as possible. Label the horizontal and vertical axes appropriately. When you finished answer the following questions.

a) Would you consider the distribution of the weights to be mound-shaped? Why or why not?
b) Is this distribution what you would have expected? Why or why not?
c) Do you think that Hershey would be interested in this type of information? Why?

HERSHEY KISSES® DATA SHEET Name: _____

Number of grams claimed by Hershey on bag _____.

1 _____	24 _____	47 _____	70 _____
2 _____	25 _____	48 _____	71 _____
3 _____	26 _____	49 _____	72 _____
4 _____	27 _____	50 _____	73 _____
5 _____	28 _____	51 _____	74 _____
6 _____	29 _____	52 _____	75 _____
7 _____	30 _____	53 _____	76 _____
8 _____	31 _____	54 _____	77 _____
9 _____	32 _____	55 _____	78 _____
10 _____	33 _____	56 _____	79 _____
11 _____	34 _____	57 _____	80 _____
12 _____	35 _____	58 _____	81 _____
13 _____	36 _____	59 _____	82 _____
14 _____	37 _____	60 _____	83 _____
15 _____	38 _____	61 _____	84 _____
16 _____	39 _____	62 _____	85 _____
17 _____	40 _____	63 _____	86 _____
18 _____	41 _____	64 _____	87 _____
19 _____	42 _____	65 _____	88 _____
20 _____	43 _____	66 _____	
21 _____	44 _____	67 _____	
22 _____	45 _____	68 _____	
23 _____	46 _____	69 _____	

Part 3 Excel

Follow the instructions given in class to enter the data you recorded on the HERSHEY KISSES® DATA SHEET into Excel®. Obtain a list of descriptive statistics and a histogram. You should also make printouts of each to turn in with your final report.

Answer the following questions:

a) What is the standard deviation?
b) Compare the Excel® histogram with your own. Are there any big differences? If so, how would you account for this?
c) In your data set, how close is the empirical rule in predicting the percent of values that fall within one standard deviation of the mean? . . . within two, within three? This will require that you actually count the number of Kisses® within one standard deviation of your mean and compute the percent for your data. Compare this to the percentages estimated by the empirical rule. Repeat this for two and three standard deviations. Show your work.
d) If your calculated percentages in part C did not line up with the percentages claimed by the empirical rule, speculate on some possible reasons for this.

Part 4 Summary

a) Summarize this activity and what you have learned.
b) Is there anything else that could or should have been considered in collecting the data?
c) In doing this activity, what did you find to be the most interesting?

Turn in all three parts of this activity including answers to all the questions, your histogram, and printouts of the descriptive statistics and histogram from Excel®.

Your answers to the questions should be neatly written out and thorough. Your final presentation must be neat and well organized for full credit.

Mock Interviewing

Grade 9-12

Subject Area Any

Overview Students identify and practice interviewing techniques to successfully secure a job.

Time Four 50-minute periods

SCANS
Allocates Human Resources
Exercises Leadership
Negotiates
Acquires and Evaluates Information
Interprets and Communicates Information
Understands Systems
Monitors and Correct Performance
Reading and Writing
Listening
Speaking
Creative Thinking
Decision Making and Problem Solving
Reasoning
Responsibility
Self-esteem
Sociability

Equipment None

Resources
Handouts
Room to conduct mock interviews

People Business people or parent volunteers

Materials None

Costs None

Contact
Nancy Brown
Fairmont High School
3301 Shroyer Road
Kettering, OH 45429
(937) 296-7701

H
All

112

Procedures PREPARATION

Contact business people and parent volunteers and arrange for them to come in and interview students on the third day. Also arrange for private space in school for individual interviews.

INSTRUCTIONS

Day 1

Objective: Identify and practice strategies to successfully secure a job

Anticipatory Set: Have students role play different situations (handout 1). Put a+ on the board overhead and ask students what was done well and what needed to be changed for each situation.

Emphasize that the list reflects the most common mistakes in interviewing. We will be working on the other mistakes you can make. We will be talking about interviewing and hopefully by the end of the week or next week we can get some business people in here to mock interview each other.

Lecture:

Four types of interviews
1. Screening—done to eliminate candidates
2. Stress—handle by not being flustered
3. Group or Board—interview by more than one person
4. Selection—most common usually done by one person who wants to uncover skills and personality

Four phases
1. Small talk phase

Interviewer puts you at ease, introduces him/herself, and shake hands (only if the interviewer offers). The interviewer introduces the job and observes you—dress, poise, self confidence, and nervousness.

You wait to sit down and make small talk and try to put the interviewer at ease. Go to interview dressed appropriately and well groomed.

Procedures continued

2. Getting information from you

Interviewer gets you involved in the conversation by asking question and allows you to talk. He or she listens to hear information from you, makes notes on application (routine), and will not show feelings about you.

You show enthusiasm about the company, yourself, interests, and the interviewer's interests. Sell yourself—tell stories about your skills and how you have shown them in the past.

Interviewer looks for:

- Sincerity—don't lie – make eye contact
- Tact—respond by agreeing and then disagreeing
- Courtesy and Attitude—be positive and enthusiastic, dress and posture are important

Discuss handouts on interviewing questions (handouts 2 and 3).

3. Interviewer gives information to you

Interviewer gives a clear picture of the job, explains company and uses examples to help you understand.

You bring up any reservations you have about the job now..

4. Close

Interviewer closes on a pleasant tone and makes sure all the information is given and taken.

You make sure you know the next step—say thank you and get out!

Activity: (handout 4) Students write a description of a job they would be likely to apply for including : qualifications needed, education needed, advancement opportunities, most of this available on OCIS or in occupational outlook handbooks. Then answer at least six questions from the handout on commonly asked interview questions as if you are applying for the job.

Day 2

Activity: Mock interview with a student in class for an example.

Activity: Divide students into partners and have them interview each other. After the interview have them rate each other on how well they have done. (Interview Analysis Sheet)

Procedures continued

Day 3

Activity: Arrange for business people to come in to mock interview students. Send out letters or contact by phone and have them rate the students on how well they interview (Interview Analysis Sheet).

Day 4

Activity: Debrief students concerning their experiences in the interview identifying the positives and the things they would change.

Note: Don't forget to send a thank you note to all business people and parent volunteers who have interviewed the students.

Handout 1

INTERVIEW ROLE PLAY SITUATIONS

Situation 1

Mr Howard:	Stands and offers his hand to John.
John:	How do you do, I'm John Jones. (looking at his watch) Was this interview at 9:30 or 10:00 a.m.?
Mr. Howard:	9:30, 1/2 hour ago.
John:	I made an appointment with your secretary about the job you have open.
Mr. Howard:	Which job is that, Mr. Jones?
John:	The clerk's job.
Mr. Howard:	How much clerking experience do you have?
John:	None.
Mr. Howard:	What kind of work have you done?
John:	Well, I've worked as a delivery boy, as a stock boy, and as a laborer.
Mr. Howard:	Why do you feel you can handle the clerk's job?
John:	I finished high school.
Mr. Howard:	Thank you for dropping by. Leave your name and phone number with my secretary, and if we decide that we need to talk further with you, we'll call.
John:	OK. I'll call back.
Mr. Howard:	Don't call us. We'll call you.

Situation 2

Announcer:	Joyce got an appointment with the personnel manager, Ms. Smith, for 10:00. At 9:58 Joyce asks the secretary to tell Ms. Smith that she is there. Joyce and Ms. Smith shake hands.
Joyce:	I came to see you about the job that was advertised.
Ms. Smith:	Which job is that, Ms. ... What is your name?
Joyce:	Joyce Black. The stock clerk job.
Ms. Smith:	Have you ever worked as a stock clerk?
Joyce:	No.
Ms. Smith:	What kind of work have you done?
Joyce:	All kinds of things.
Ms. Smith:	Why do you feel you can handle the clerk's job?
Joyce:	Well, I do need some kind of a job.
Ms. Smith:	I'm sorry Ms. Black, I'm very busy right now. You can leave your name with my secretary, and if we want to talk with you further, we'll get in touch.

Handout 2

WHAT TO CONSIDER WHEN ANSWERING THE MOST COMMON INTERVIEW QUESTIONS

In addition to informing yourself about the company you'll be visiting, there are many ways to prepare for an interview. The best way to do that is to Prepare....Prepare...Prepare! Here are some answers to consider when answering the most common interview questions.

"You've changed jobs frequently. Why?" Always talk about better opportunities and more money. Focus on more challenge in each job. Never say you had disagreements with your boss or co-workers.

" Have you ever been fired?" This can be checked, so don't lie! If the answer is yes, you might want to address differences in personalities, styles and/or objectives. Never bad mouth the company.

"Do you prefer working with others or independently?" Unless you really do prefer one way or the other, express how you can work in both situations.

"How should people criticize you, and how do you criticize others?" Always talk about preferring positive constructive criticism in both situations.

"How many hours per week do you think someone should spend on the job?" You probably want to be very careful here expressing that you will put in time to get the job done in the best way possible. After all the outcome is more important than how many hours it took you to get there.

"What do you know about the company?" Be prepared with some information about such things as products, size, sales, profit, reputation, philosophy, history, people, etc. It is important to do your homework in this area.

"Why do you want to work for us?" Describe some contribution you think you can make to the company goals. Don't fake it.

Handout 3

COMMONLY ASKED INTERVIEW QUESTIONS

1. Tell me about yourself.
2. How did you hear about us?
3. What is or was your best subject in school? Your worst? Your favorite?
4. If you could pick the job of your choice, what would you choose to do?
5. What work experience have you had that would help you in this job?
6. What are your short-term and long-term goals?
7. What does success mean to you?
8. Tell me about your last job. Why did you leave?
9. Why do you want to work for our company?
10. What are your strong points?
11. What are your weaknesses?
12. What do you consider your greatest accomplishment?
13. What do you consider your greatest failure?
14. What do you like most about yourself?
15. What do you like least about yourself?
16. What is important to you in a job?
17. How can you help this company?
18. Are you willing to relocate?
19. How has your education prepared you for this job?
20. How soon can you start?

Handout 4

MY IDEAL JOB

Job Title:

Qualifications needed:

Education needed:

Advancement opportunities:

Six Interview Questions

Please take six questions from the handout on commonly asked questions and write the question and your answer here.

Handout 5

INTERVIEW ANALYSIS SHEET

Date _____

Position _____ Name _____

Present Employer _____ Job Title _____

Date available for work _____

Comments:	Rating High			Low
1. Personal Traits:	1	2	3	4
A. Appearance	____	____	____	____
B. Poise and confidence	____	____	____	____
C. Tact and courtesy	____	____	____	____
D. Enthusiasm and friendliness	____	____	____	____
2. Ability to express ideas:				
A. Articulate	____	____	____	____
B. Fluent; acceptable command of English	____	____	____	____
C. Pleasant, clear and forceful voice quality	____	____	____	____
D. Responsive, logical, and objective	____	____	____	____
E. Assertive	____	____	____	____
3. Interpersonal Relationships				
A. Genuinely likes people	____	____	____	____
B. Understands and accepts different social and economic backgrounds	____	____	____	____
C. Interacts well with others	____	____	____	____
4 Professional attitude/motivation				
A Interest and knowledge of profession	____	____	____	____
B Growth oriented; short and long-term career goals evident	____	____	____	____
C. Leadership in profession	____	____	____	____

General statement regarding candidate:

Rating for this candidate is:

A. Outstanding _____
B. Good _____
C. Acccptable _____
D. Unacceptable_____

Much Ado About Matrices

Grade High School

Subject Area Algebra I and II

Overview By being managers of a music store and by making school-colored banners, students learn the basic operation of matrices (+, -, scaler multiplication) while also seeing where matrices are applicable in real life.

Time Three days of class time (42-minute periods)

SCANS Information, Systems, Technology, and Basic Skills

Equipment None

Resources None

People None

Materials None

Costs None

Contact Rosie Matthies
Shawnee High School
1675 E. Possum Rd.
Springfield, OH 45502
(937) 324-9296

Procedure Pass out *Music Mall* worksheets. It is suggested that music titles be changed to reflect current popular music.

MUSIC MALL

Music Mall is a music store. For every title Music Mall stocks copies in compact disc (CD), cassette tape, and record album format. The store employees need to know how many of each title in each format is in the store. They keep the information in a table like the one you see below.

Store Inventory – Music Mall
October

Artist – Title	# of CD's	# of Tapes	# of Albums
Meat Loaf – "I'd Do Anything for Love"	22	36	12
Janet Jackson – "Again"	36	50	20
Mariah Carey – "Dream Lover"	14	25	9
Zhane – "Hey Mr DJ"	19	27	12
Billy Joel – "The River of Dreams"	3	0	5

Mathematicians would call an arrangement like this a MATRIX. A matrix is a set of information arranged in rows and columns. The position of each number tells you information about the number. For example, the number in the third row, second column tells you how many Mariah Carey tapes are in the store. To find a number, we use the row number followed by the column number address. This leads to using an ordered pair like (4,1) as an address for the number of Zhane compact discs in the store.

What does the number in second row, first column tell us?

What is the ordered pair address for the number of Janet Jackson albums?

Mathematicians can use the matrix without the titles on the left for operations on the numbers.

Example:

$$\begin{bmatrix} 22 & 36 & 12 \\ 36 & 50 & 20 \\ 14 & 25 & 9 \\ 19 & 27 & 12 \\ 3 & 0 & 5 \end{bmatrix}$$

Every month Music Mall gets a shipment of titles to replace those that have been sold. Along with the CD's, tapes, and albums the store receives a packing list that shows what is being delivered. How can they update the matrix of what is in the store.

This next matrix is the packing list to restock the store at the end of October. Use the original inventory matrix and re-stock to complete the After Restock Inventory matrix.

Restock – Music Mall
October

Artist – Title	# of CD's	# of Tapes	# of Albums
Meat Loaf – "I'd Do Anything for Love"	8	0	3
Janet Jackson – "Again"	4	10	5
Mariah Carey – "Dream Lover"	6	5	1
Zhane – "Hey Mr DJ"	31	33	13
Billy Joel – "The River of Dreams"	57	50	15

After Restock – Music Mall
October

Artist – Title	# of CD's	# of Tapes	# of Albums
Meat Loaf – "I'd Do Anything for Love"			
Janet Jackson – "Again"			
Mariah Carey – "Dream Lover"			
Zhane – "Hey Mr DJ"			
Billy Joel – "The River of Dreams"			

Explain how you completed the After Restock Inventory matrix.

As with any store the purpose of having inventory is to sell it. Music Mall keeps track of the CD's, Tapes, and Albums that are sold so that they can order the next shipment to restock at the end of the November. Use the matrix you completed on the previous page and the Sale matrix below to complete the After Sale inventory matrix.

Sales – Music Mall
November

Artist – Title	# of CD's	# of Tapes	# of Albums
Meat Loaf – "I'd Do Anything for Love"	5	9	1
Janet Jackson – "Again"	20	32	9
Mariah Carey – "Dream Lover"	6	4	2
Zhane – "Hey Mr DJ"	35	24	10
Billy Joel – "The River of Dreams"	45	39	17

After Sales Inventory – Music Mall
November

Artist – Title	# of CD's	# of Tapes	# of Albums
Meat Loaf – "I'd Do Anything for Love"			
Janet Jackson – "Again"			
Mariah Carey – "Dream Lover"			
Zhane – "Hey Mr DJ"			
Billy Joel – "The River of Dreams"			

Describe how you completed the After Sales Inventory matrix.

Define MATRIX ADDITION:

Define MATRIX SUBTRACTION:

Use the definitions to simplify the following problems.

1 $\begin{bmatrix} 6 & 12 & 19 & -7 \\ 0 & 32 & 14 & -12 \\ 19 & 42 & 85 & 46 \end{bmatrix} + \begin{bmatrix} 42 & 36 & 91 & -15 \\ -25 & -84 & 45 & 52 \\ 6 & 32 & 44 & 98 \end{bmatrix}$

2 $\begin{bmatrix} 9 & 7 & 5 \\ 3 & 8 & 15 \end{bmatrix} - \begin{bmatrix} -4 & 5 & 9 \\ 8 & 2 & 9 \end{bmatrix}$

3 $\begin{bmatrix} 5 & 9 \\ 1 & 2 \\ 8 & 7 \end{bmatrix} + \begin{bmatrix} 9 & 4 & 8 \\ 2 & 6 & 5 \end{bmatrix}$

4 $\begin{bmatrix} 8 & 4 \\ 2 & 9 \end{bmatrix} + \begin{bmatrix} 6 & -5 \\ 9 & 3 \end{bmatrix}$

5 $[45 \quad 14 \quad 63] - [32 \quad 89 \quad -21]$

6 $\begin{bmatrix} -8 & -7 \\ 5 & 4 \\ 2 & 3 \end{bmatrix} + \begin{bmatrix} -4 & 5 \\ 9 & 6 \\ -8 & 6 \end{bmatrix} - \begin{bmatrix} -5 & 9 \\ 4 & -2 \\ 1 & 0 \end{bmatrix}$

7 Is matrix addition commutative? Give examples.

8 Is matrix addition associative? Give examples

9 What would be the identify matrix for matrix addition?

The Mystery Boxes

Grade 10-12

Subject Area Physical Science (Math Connection)

Overview This is a good project to do early in the year to get the students involved in scientific thinking and working in teams. It involves indirect measurement and designing and reporting an experiment.

Time Allow one or two 50-minute class periods for the experiment. Allow more time if students are permitted to use class time to work on their reports. If computers are available, it is suggested that students be given time to write up their report on a word processor.

SCANS Students gain opportunities to allocate human resources, participate as a member of a team, acquire and evaluate information, use computers to process information, improve and design systems, and apply technology to a task. Students develop and reinforce basic skills such as reading, writing, math, listening, and speaking. Creative thinking, problem solving, and reasoning skills are all a part of this project. Development of personal qualities such as responsibility and sociability are enhanced by this project.

Equipment None

Resources None

People None

Materials Electronic or triple beam balance
Empty paper clip boxes
Several hundred loose paper clips
Three mystery boxes labeled A, B, and C
Graph paper

Costs Less than $5.00

Contact James Stevens, STW Physics Teacher
Northridge High School
2251 Timber Lane
Dayton, OH 45414

Procedures

Note to Teacher: No matter what method students choose to solve this problem, have them make a graph with number of paper clips on the z-axis and total mass in grams on the y-axis. You then can teach them how the slope of the graph relates to the mass of a paper clip. When gathering data for the graph, if the empty box is used as a part of the total mass, you can discuss how the mass of the box relates to the y-intercept. This is a good way of showing connections between science and algebra.

Instructions for Students

On the front desk are three paper clip boxes (labeled A, B, and C) which are taped shut. They contain various amounts of No. 1 paper clips. These boxes are not to be opened under any circumstances over the entire duration of the lab.

Working in groups of two or three, your team goal is to design and carry out an experiment to determine the number of paper clips in each box. You may use the equipment listed above in carrying out this experiment.

Take notes on your procedure and the results of your experiment. Use the notes to write a report about your experiment. Each person in the class must turn in a typewritten, computer-generated report. The report should include:

1. Your name, course name, date, and title of the experiment (5 points)
2. The purpose of the experiment. (10 points)
3. List of materials used in your experiment. (10 points)
4. A clear and complete description of your procedure. (25 points)
5. A chart to organize your data from the experiment. (15 points)
6. A graph using the data from your chart with the mass of paper clips on the y axis and number of paper clips on the x axis. (Hint: The graph could be a key factor in your experiment.) (15 points)
7. A summary of the results and conclusions of your experiment in a final paragraph. The summary should include a description of possible sources of error. (20 points)

Occupation Observations

Discovering Careers While Reading

Grade Middle school

Subject Area Language Arts and Reading

Overview It is suggested that this ongoing activity be introduced at the beginning of the school year. A goal of the activity is to allow students the opportunity to become aware of and explore careers, as well as the education (training) needed. Another goal is for students to take a realistic look at the job market in their futures, thus assisting their making appropriate choices for job shadowing and high school course selection.

Time *First Semester:*
Allow twenty minutes to explain the method of gathering pre-research data. Thereafter, five to ten minutes should be given for each "Occupation Observation" session. The number of sessions is to be determined by the number of observation assignments required by the teacher.
Second Semester:
Two to three class periods should be given to students, at least one for research and the remaining time for inputting data on template for final project.

SCANS Students, in addition to allocating time, are afforded opportunities to participate with others and contribute to the group with ideas and suggestions. Students acquire and evaluate information, organize and maintain information, interpret and communicate information and use computers to process information. Students reinforce reading, math, writing and oral communication skills.

Equipment Computers are needed if template is used for final project.

Resources None

People None

Materials *Pre-research:*
Class texts and trade books currently in use are appropriate. Newspapers and magazines may be purchased or dated issues solicited from parents, staff members, etc. A modified *Occupation Observations* worksheet for pre-research activities may be teacher generated.
Research:
Occupational Outlook Handbook and other career reference books
Post-research:
Occupation Observations template or worksheets of the same

Costs Cost is determined by the teacher's desire to have current issues of newspapers and magazines, otherwise there is none. Teachers are encouraged to use current class resources.

Contact This module was developed by Susan R. Mark, Department Chair, English and reading teacher, West Carrollton Middle School, 424 E. Main Street, West Carrollton, OH 45449-1357 (Phone: *937/859-8296, FAX 937/859-5301)* and is used in this handbook with her permission.

Procedures

First Semester

INTRODUCTION
Through journaling and class discussion, students write and share career goals and how they are preparing themselves for those goals. Through brainstorming, students examine careers of the past, present, and future.

PRE-RESEARCH
Step One:
In teams and using the "Classified" section of the newspaper, students locate ads for five different occupations, discuss, and make "educated guesses" as to the yearly salary and education (training) needed for each on pre-research worksheet. (Note: In addition to reading skills, math skills are often needed to convert hourly, weekly, and monthly salaries mentioned in ads into yearly amounts.)
Step Two:
Utilizing short stories, poems, novels, and other reading assignments, students document on pre-research worksheet two careers mentioned (or inferred) in each genre. Places of employment as well as actual jobs mentioned may be used to generate data. This activity may be completed after each selection is read or at the teacher's discretion with the goal being that students become acclimated to completing this activity with each reading. students must document each source, i.e. title of work, date read, estimated yearly salary and estimated education needed for each.

Second Semester

RESEARCH
After being introduced to the *Occupational Outlook Handbook* and other career reference materials, students document researched salaries and education needed for the occupations discovered in their occupation observations. This can be accomplished in teams or through individual research.

DOCUMENTATION
Using the template, students input all data from "Occupation Observations" to be part of final project.

Procedures continued

The final project, a reaction paper, should include analysis of documented findings (i.e. jobs most desired and why compared to jobs least desired and why), career interest for job shadowing, and how to prepare for career of choice. (Additional research may be needed.)

OCCUPATION OBSERVATIONS

Name: _____ Date: _____ Period: _____

List the source (i.e., television, newspaper, magazine, textbook, teacher generated material, etc.).

Source	Occupation	Est. Income for Current year	Est. Education needed	Researched Income	Researched Education

Problem-Solving Scenarios

Grade 3-8

Subject Area Any subject—curriculum integration

Overview Students working cooperatively in small groups use "trial and error" problem solving skills to solve a fictitious problem.

Time 50 minutes per scenario

SCANS Interpersonal: Participates as a member of a team, works cooperatively with others and contributes to the group with ideas and, suggestions, and effort
Thinking Skills: Creative thinking and problem solving

Equipment None

Resources None

People None

Materials *Scenario One:*
Per group of three to five students:
- Yard or meter stick
- Plastic two-pound margarine container or similar type container
- Five large rubber bands
- Three yards of heavy string or yarn
- Five paper clips

Per class:
- Masking tape
- Scissors

Optional Scenario Two:
Yard or meter stick
Balloon (large enough when inflated to fit inside margarine container—don't reveal this fact to the students—plus a few extra in case one breaks)
Three yards of heavy string or yarn
Twister (type used to close bread wrapper)

Costs Minimal, if materials are readily available in school office or craft supplies

Contact Virginia Wysong
Tri-County North School
570 Panther Way
Lewisburg, OH 45338
(937) 833-4330

E M All

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Procedures

1. Each group of three to five students should be assigned to a different area of the room where they should measure and enclose with masking tape a one square (or meter) area on the classroom floor. The plastic container should be placed in the middle of the square area. Each group should use the set of materials listed above to cooperatively solve the scenario, which the teacher reads to the class as a whole. A time limit of 20-30 minutes should be preset by the teacher unless time permits unlimited trial and error by the teams. Encourage students to brainstorm, discuss, and try various ways to solve the problem in the scenario. At the end of the present time period, each group should demonstrate to the whole class how they solved the problem or, if not solved, at least a few of the ways they tried.
2. The teacher should process the lesson by asking groups to either put in writing or discuss group behaviors that helped achieve their common goal of problem solving and behaviors that hindered the group. (Examples: Lots of talking and suggestions, brainstorming, taking turns, voting, lots of trial and error, lots of questioning, thinking, analyzing why something didn't work)

Scenario One:

A specially-ordered part to fix a crucial machine at the factory on an island had to be sent by air transport. Dense fog prevented the plane from landing. The part was urgently needed. The plane's crew radioed the factory and communicated the problem. The factory foreman requested that the part be dropped in the large field next to the factory. He would place an electronic transmitter in the middle of the field so that the plane's electronic sensor would signal where to drop the part. The plane's crew attached a "makeshift" parachute to the packaged part before dropping it out of the plane to prevent breakage. The plane dropped the package at precisely the right moment according to the electronic sensor. However, due to wind drift caused by the parachute, which just happened to snag on a nearby tree branch and detach moments before it hit the ground, the package landed very gently in a one square yard of quicksand instead of the field.

Your job is to retrieve the package (which is the two-pound margarine tub) without stepping in the quicksand (which completely fills the 1 square yard area marked by the masking tape). You may not lean over the quicksand as you might fall in and be stuck. You may not push or pull the package through the quicksand as it might sink further. Therefore you must use only the materials provided and work as a team to lift the package gently up and out of the quicksand.

Procedures continued

Scenario Two:

While you are hiking in the woods you come across the stolen precious diamond that you heard about in the news yesterday. The huge diamond is nestled inside an ordinary margarine tub in the middle of a very small area of toxic waste. Perhaps the thief put it there because he or she thought no one would risk crossing or falling into the toxic waste to recover the diamond. Regardless of the reason you must recover it quickly before the thief returns. Everyone in your hiking group looks through their pockets for things to use and the only things they can find are a balloon, some string, a twister, and also the walking stick (yard stick) that someone is using as a walking aid. Your job is to retrieve the diamond, which is in the two-pound margarine tub without stepping in or leaning over the toxic waste (which completely fills the one square yard area marked by the masking tape). You may not push or pull the container through the toxic waste as it might fall over and be lost or contaminated forever. Therefore, you must use only the materials provided and work as a team to lift the package gently up and out of the toxic waste.

Optional Scenarios: Challenge your students to write a new scenario for you to use with a different class which uses the same or different materials.

POSSIBLE SOLUTIONS

Scenario One:
Tie four strings to different quadrants of the rubber band. Four different people each hold a string and each stands on a different side of the square. As each person simultaneously pulls their string the rubber band expands wide enough to slip over the open rim of the margarine tub and then close securely around the outside of the tub. Each person can then lift together and raise the container out of the quicksand.

Scenario Two:
Inflate the balloon just a little bigger than the estimated diameter of the container. Do not tie the balloon, as the size of the balloon might need to be adjusted. Use the twister to temporarily close the balloon and attached it to the string that in turn is attached to the stick. Lower the balloon into the margarine tub. Tap it slightly with the yardstick so it's wedged inside. Then lift the balloon and the attached tub up and out.

Recycle City

Decisions about Garbarge

Grade 4-8

Subject Area Math (addition, division, rounding decimals, and calculating rate)
Reading (comprehension and evaluation)
Environmental science (recycling, reusing, composting)

Overview Students work individually or in small groups on computers connected to a specific interactive Website sponsored by the Environmental Protection Agency. In Recycle City, students graphically explore the city and read how people are trying to preserve the environment. In the Dumptown game, students act as the mayor of the town and choose which reduction programs to implement the results of their decisions.

Time Minimum of two 50-minute blocks of time

SCANS Resources: Allocates money
Basic Skills: Reading, Math, and Speaking
Thinking Skills: Decision-Making

Equipment One computer with live access to the Internet per group.
Browser software with Shockwave plug-in (available for free download via Internet)
Calculators (handheld or computer desk accessory)

Resources Internet sites:
www.epa.gov/recyclecity/mainmap.htm
www.epa.gov/recyclecity/dumptown.htm

People None

Materials Worksheets

Costs None, unless there's a charge for Internet connection time at your school

Contact Virginia Wysong
Tri-County North School
570 Panther Way
Lewisburg, OH 45338
(937) 833-4330

Procedures

Reading/Critical Thinking Emphasis:

The teacher should introduce the lesson by showing students the following site together as a whole class: **www.epa.gov/recyclecity/mainmap.htm.** Show students how to navigate to the various businesses and community buildings in the city. Show how to click on different people or things inside the buildings to reveal a short paragraph telling how that person or thing is specifically protecting the environment by reducing the amount of waste that goes to the city's landfill.

For younger students or shorter time periods, assign each group of students a different business or building to explore. Instruct them to read about each person or thing and nominate just one as the most worthy to deserve the monthly "Save the Environment" award. If time permits, younger students as well as older students can explore either businesses or buildings. Students should share their reasons with the class through a very short persuasive oral presentation.

Math/Critical Thinking Emphasis:

For younger students, or to save time, the teacher should demonstrate how to play the game at the following site: **www.epa.gov/recyclecity/dumptown.htm.** Show students how to navigate through the various screens. Read together and discuss several of the descriptions about different programs. Point out how to calculate the cost or saving of a program and the total tons of waste recovered. Note that the Pay as You Throw program saves ten percent instead of a specific amount.

Students should play the Dumptown game and complete all the information on both of the Dumptown worksheets.

Environmental Science:

Students could conduct additional research about the various programs featured at the site. Students could use the Internet, the library, or local EPA agencies.

Rubber-Band Racer Quality Control

Grade 9-10

Subject Area Science

Overview This activity introduces students to the need for accuracy and quality control in a typical assembly type environment. This activity also introduces students to typical measuring devices, such as electronic scales and micrometers.

Time Set-up time for the teacher is between around 15 minutes. Students will take between one to two hours depending on number of students.

SCANS This activity helps to develop several competencies including technology, systems, resources and interpersonal skills. This also helps with the foundations of basic skill building and personal quality development.

Equipment
Scales (electric and spring)
Rulers
Micrometers
Meter stick
Tape

Resources None

People None

Materials Several "rubber-band racer kits" (depending on number of students)

Costs Overall costs should be negligible if equipment that is already available is used. The kits can be purchased for around $20.00, or other items such as Legos could replace these kits. I had no out-of-pocket expenses.

Contact
George Limes
Shawnee High School
1675 E. Possum Road
Springfield, OH 45502
(937) 325-9296

Procedures

1) Split students into six groups based on the six headings given in the lab.
   - Part Separation and Quality Checking
   - Base Assembly
   - Tail Assembly
   - Body Assembly
   - Final Product Assembly
   - Final Product Testing

2) In the group that separates and checks parts, have them follow the specifications set forth on the specification sheet.

3) In the groups which assemble the product, have them follow the directions included in the kit (or if modified, your directions you provide). Have them check the specifications indicated on the specification sheet.

4) With the group that tests the final product, have them use tape to mark off the required distance indicated in the specifications for the racer. Have them check all specifications.

Extra real world experience: As a follow up activity, have the students take a field trip to a local assembly facility. Some businesses will allow tours, but usually limit the number of students to eight to ten.

SPECIFICATIONS FOR RUBBER-BAND RACER

PARTS

Wheels

	Mass (grams)	*Number Needed*	*Total Mass (grams)*
Big wheel	50.0 +- .1	2	NA
Small wheel	7.8 +- .1	2	NA

Pieces

Green	1.9 +- .1	10	19
White	3.4 +- .1	3	NA
Tan	.5+- .1	4	NA
Yellow	2.3 +- .1	11	25.3
Red	1.4 +- .1	10	14
Dark Grey	.7 +- .1	35	24.5
Orange	1. 1+- .1	6	NA
Light Grey	1.1+- .1	2	NA

Rods - All diameters (diagonals) must be less than 6.25 mm

White	.5 +- .1	9	4.5
Yellow	1.8 +- .1	8	14.4
Blue	1.0 +- .1	9	9.0
Grey	4.2 +- .1	3	NA
Black	6.1+-.1	1	NA
Red	2.8+- .1	5	NA
Green	.4 +- .1	12	4.8

Rubber-Bands
All rubber-bands when stretched 500 mm, must produce above a 20 N force.

ASSEMBLY

Base
Stage 1 Base - Mass = 230 9 +-1g

Tail
Stage 2 Tail - Mass = 28.3 9 +- .1g

Body
Stage 3 Body - Mass = 54.3 9 +- .1g

Final Product
Mass = 318 9 +- 10 9
Length = 450 mm +- 5 mm
Width (rear wheels) = 165 mm +5 mm
(front wheels) = 50 mm +- 5 mm
Upon backing (winding) the car 100 cm, the car must travel beyond 160 cm.

Science Fair/Invention Fair/Ecology Fair

Grade K-12

Subject Area Science

Overview As a way of developing an appreciation by students of investigative techniques, science fairs, invention fairs, and ecology fairs are becoming increasingly popular. This unit will provide the fundamentals for conducting a fair.

Time At the beginning of the year, some extensive time may be necessary to provide students with goals, forms, dates, etc. After that periodic updates would be appropriate.

SCANS Resources, Interpersonal, Information Systems, and Technology

Equipment This will vary, depending on the grade level and the degree of difficulty of the individual or group student projects.

Resources
Science fair packet
Invention fair packet
District and State science fair materials
Inventioneering
Bibliography on invention fairs
Trophies for winners and other awards for all students

People
Community professionals
Research scientists
University associates
Government agencies

Materials
Awards
Certificates
Ribbons
Tables
Refreshments

Costs $250.00 entry fee may be charged to offset some cost

Contact
Mrs. Georgie Rosier
Ferguson Jr. High School
2680 Dayton-Xenia Rd.
Beavercreek, OH 45434
(937) 429-7577

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Science Fair/Invention Fair/Ecology Fair, continued

Procedures

It is so very important that we encourage all students to have an interest and an understanding of investigative techniques. For this reason, science fairs, invention fairs, and eco. fairs are of primary importance. Students should work independently or in pairs on science fair projects, in small groups or independently on invention fair projects, and individually or in groups on environmental projects. Work and discussion of these projects should begin early in the academic year to allow ample time to complete necessary work.

The teacher must offer encouragement for entering these endeavors. Students obviously lead very busy lives, so something must be presented to them to encourage them to enter. This could be in the form of extra credit, prizes, or public recognition. From the beginning, it is important to involve individuals in various professional positions in a mentoring role with the students.

It is suggested that time should be provided before and after school for student/mentor work sessions. This will allow for interactions of a valuable nature. It is encouraged that students should work with individuals that have expertise in the appropriate fields pertaining to the project topic.

The Showboard Resource Catalog is a great source of materials for science fairs, invention fairs, and ecology fairs. Their toll free number is 1-800-323-9189. Also, Superior Distributing is another great source of materials and can be reached toll free at 1-800-365-6661.

1. Reserve the location and get on the school calendar before the close of the school year before the fair.
2. At the beginning of the year, inform students of date of the fair (usually in Spring). Continue to remind them to be thinking of projects
3. Just before Christmas break, pass out the packets to students.
4. Have students turn in entry forms in January.
5. Conduct in-class, before school, or after school mentoring sessions. Find outside people from business and industry to help the students in their particular projects.
6. Consider renting tables from a local rental agency.

Science Fair/Invention Fair/Ecology Fair, continued

Procedures continued

Suggestions:

1. Allow students to change projects at any time up to a month before the fair.
2. Ask students to keep journal logs of their progress. Display these journals at the fair. Journal logs include:
   - How they arrive at their project idea
   - Materials used and cost
   - Time spent and activities for each time block
   - List of people consulted
   - Problems encountered and how they were solved
   - Successes
   - Project summary—what they learned
   - Personal reactions at every stage
3. Encourage everyone to enter.
4. Discourage judges from giving low ratings. The idea is to make each student proud of his/her effort. Also encourage judges to be reassuring rather than critical in exchanges with students. (Keep this confidential - students do not need to know this).
5. Encourage students to work in teams of two or three.

Seven Habits of Effective People

Grade 9-12

Subject Area Any

Overview Using the Seven Habits of Highly Effective People as taught by Stephen Covey's book, one high school teacher has adopted the concept to help students learn ways to become an effective person. She has added additional resources such as movies, games, stories, banners, speakers, handouts and stickers to augment the basic concept.

SCANS
Allocates time
Participates as a team member
Exercises Leadership
Negotiates
Works with Diversity
Listening
Speaking
Creative Thinking
Decision Making
Problem Solving
Seeing Things in Minds Eye
Reasoning
Responsibility
Self-Esteem
Sociability

Contact
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Credit Franklin Covey Co. has created training programs and products based on the Seven Habits of Highly Effective People. The title, each of the Habits, and key words and model in this content are trademarks of Franklin Covey. Franklin Covey has successfully licensed educational organizations to implement the Seven Habits program within their schools. For more information and licensing procedures, please contact Jenny Sarantis, Intellectual Property Specialist, Legal Services, Franklin Covey, at (800) 331-7716, ext. 64016.

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All

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Shake, Rattle and Roll

Earthquakes in Ohio?

Grade High School

Subject Area Earth Science and Algebra II

Overview Students will become geologists in the activity when they are asked to research a historic earthquake for the government. While working in teams, students will practice such skills as analyzing, communicating, and predicting.

Time Approximately one week (42-minute periods) after data has been received and lessons have been discussed on plate tectonics, earthquakes, map reading, and logarithms (optional)

SCANS Resources, Interpersonal, Information, Systems, Technology, Basic Skills, and Thinking Skills

Equipment Internet access (optional)

Resources Ohio Department of Natural Resources
Division of Geological Survey
Geological Records Center
4383 Fountain Square Dr.
Columbus, OH 43224-1362
(614) 265-6576

People Geology professor from a local university

Materials Topography maps for your area from the Division of Geological Survey

Costs $4.00 for every map purchased
Minimal mailing costs

Contact Rosie Matthies
Shawnee High School
1675 E. Possum Road
Springfield, OH 45502
(937) 325-9296

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Procedures

1. State the following situation: The government is looking for a site to dispose of nuclear waste. Several sites are being scouted including the land adjoining our school. There are many issues to deal with, but the government has hired you to specifically look at the stability of the land. They are concerned with an earthquake that was felt in our county in 1930 and want you to determine its destruction, magnitude, and epicenter.

2. Have the class discuss possible resources for the above situation. Put students in groups of three or four per team. Divide up the list of resources to each team and have them write a letter to each asking for information concerning the 1930 earthquake.

3. While students wait for responses, proceed with lessons dealing with one or all of the following: plate tectonics, earthquakes including the Mercalli Scale, topography map reading, and/or logarithms.

4. As responses come in for the various teams, copy information for all of the teams. Remind teams that thank-you notes should be sent to the people who have responded.

5. Once the information has been collected, have the teams begin to work on the original issue posed to them: Is the land stable? Why or why not? What facts support your opinion? What magnitude did the 1930 earthquake have in our area? Where was the epicenter of the 1930 earthquake located?

6. Teams should present their findings to the entire class. Topography or isoseismal maps should be used to support conclusions.

7. (Optional) Once all groups have presented, you can have each individual student write a letter to the government detailing the findings and describing the 1930 earthquake.

Credit Credit for initial idea of studying a historic earthquake goes to Deb Hemler and Tom Repine, authors of West Virginia Rock Camp.

Spend a Million

Grade 4-12

Subject Area Math, Technology, Accounting, and Career Education

Overview This project is designed to help students understand the process involved in developing a budget and balancing funds.

Time This will ultimately depend on the individual instructor. Some students might need more class time to allow for additional interactions between teacher and students. two to three 50-minute periods, plus some students will work on their own (depending on abilities)

SCANS Allocates Money
Acquires and Evaluates Information
Interprets and Communicates Information

Equipment Individual student computers (helpful but not necessary since students will be working on their own)

Resources Bank statements
Accounting books and records
Checks (both blank and pre-written)

People Bankers
Accountants
Salespeople
Architects
Builders
Construction workers
Advertisers
Government employees

Materials None

Costs Minimal, if any, since most individuals involved in a project such as this would enjoy participating without being levied

Contact Mrs. Georgie Rosier or Mrs. Joanne Orr
Ferguson Jr. High School
2680 Dayton-Xenia Rd.
Beavercreek, OH 45434

E M H All

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Procedures The teacher should begin this unit/project by first introducing the fundamental concepts which are included in the spending of money and budgeting of a large sum of money. Students must obviously be aware of how to maintain a ledger, write checks, properly budget, and work cooperatively.

The teacher should begin to contact the public individuals that are needed to mentor this program early since many of them will have busy schedules. Times should be arranged that are comfortable for all so that resentment will not develop. Mentoring professionals can be utilized for classroom presentations or for one-on-one group mentoring situations in the classroom. The teacher should be certain to publicly recognize the efforts of those individuals through the news media, school newsletters, etc.

Students can work alone or in cooperative learning settings in small groups on this project. It is strongly encouraged that students not be allowed to work in large groups since it is important for all individuals to become totally involved in the program.

A copy of a sample of the project follows on the next pages. Obviously, it can be adjusted or modified to fit student needs.

Name: _____

SPEND A MILLION

You have $1 million to spend. You must write a check for the six purchases. Please do not cut the checks out. Purchases beyond the first six do not require a written check. Each purchase must have an ad from a newspaper, magazine, Internet, or company to show the purchase price. All entries must be made on the attached sheet. All checks must be turned in with entry sheet. THIS SHEET WILL BE ONE OF THE FIRST SHEETS IN YOUR PROJECT. Other sheets turned in will include the attached forms and copies of checks that you write.

Guidelines:

1. No single purchase can exceed $300,000.
2. No more than one house or piece of property will be purchased.
3. No more than two motorized vehicles may be bought. This includes cars, trucks, motor homes, planes, and boats.
4. Money may not be put into savings accounts.
5. Money may not be used to buy stocks, bonds, certificates of deposit, or mutual funds.
6. At least 25 entries must be made on the balance sheet.
7. Money may not be given away or donated.
8. Money may not be used to pay income or inheritance taxes.

You must spend the following amounts to get the assigned points:

- 40 points - $950,000 - $1,000,000
- 35 points - $875,000 - $949,999
- 30 points - $800,000 - $874,000
- 25 points - $700,000 - $799,000
- 20 points - Less than $700,000

You must write the following number of checks correctly to get the assigned points.

- 20 points - 6 checks
- 15 points - 5 checks
- 10 points - 4 checks
- 5 points - 3 checks
- 0 points - less than 3 checks

You must make the following number of correct entries to get the assigned points:

- 20 points - 25 entries
- 15 points - 22-24 entries
- 10 points - 18-21 entries
- 5 points - 12-17 entries
- 0 points - Less than 12 entries

Early turn in bonus _____

Project Grade _____

Please number each receipt to correspond with each entry.

You are not allowed to use computer generated balance. You must use the balance sheets attached to the project. If you need more that the two that are attached to the project, then see your math teacher.

If you have any questions see your math teacher.

Hints for using the balance sheet:
Item A will be sequential (i.e., 1,2,3, etc.)
Item B will be the date you bought the item.
Item C should be the person or business to whom the check is written.
Item D initial deposit will be $1,000,000 (this should be the only entry in this column, unless you decide to add a previous purchase back into your account).
Item E is the amount of our purchases.
Item F is your balance (amount left to spend). You will start out with $1,000,000 and then subtract each purchase from the previous line balance (your item number 2 will be $1,000,000 minus your first purchase - Column E).

A Item Number	B Date	C Description	D Deposit (+)	E Payment (-)	F Balance

Check Number ___

Date _____ 19___

EXAMPLE

Pay to
the Order of _____ $ [ ]

_____ DOLLARS

Signature _____

A Spoon Full of Sugar

Grade High School

Subject Area Algebra II

Overview Students will research the effects of a prescription drug on one's body while relating it to the mathematical topic of sequence.

Time Initial Problem—one class period (42 minutes) after practice with sequences. Actual Project—two weeks outside of class (best if students are given two weekends)

SCANS Resources, Interpersonal, Information, Systems, Technology, Basic Skills, Thinking Skills, and Personal Qualities

Equipment Internet access (optional)

Resources Any family prescription drug book

People Physicians and pharmacists

Materials None

Costs None

Contact Rosie Matthies
Shawnee High School
1675 E. Possum Rd.
Springfield, OH 45502
(937) 324-9296

Procedure After a few days of practice with sequences and sequence notation, have students complete the following application problem in groups during a portion of a class period.

A patient takes a capsule containing 20 mg. of a prescribed drug early in the morning. One-fourth of the remaining drug is eliminated from the patient's body by that same time one day later. Write a recursive routine, which provides the daily amount of this drug in the patient's body. How long before there is less than one mg. of the drug present in the patient. Suppose the same patient takes a 20 mg. capsule early each morning. As before, the body removes one-fourth of the drug and then he pops in another capsule. Write a recursive routine, which provides the daily accumulation of this drug in his body. To what level will the drug eventually accumulate?

Procedures continued

Have students present solutions and then discuss the results in terms of common illnesses, the need for proper directions, etc.

Present the project to the students. See "A Spoon Full of Sugar" exercise.

Credit

Problems from the *Graphing Calculator Enhanced Algebra Project*. Authors Jerald Murdock, Ellen Kamischke, and Eric Kamischke. Copyright 1992, GCEAP.

A SPOON FULL OF SUGAR

Many of you have aspirations to be in a medical profession. Whether you do or not, it is still very important to know about how prescription drugs effect you and the illness you have.

For this project, you will choose a well-known prescribed drug to research. At least two sources are required. One may be a family prescription book or the Internet while the other must be a professional such as a physician or pharmacist. Your final product, in the form of a paper, should address all, but is not restricted to, the following items and questions:

- Names of the prescribed drug (both common and chemical)
- Purpose of the prescribed drug
- Possible side effects of the prescribed drug
- Reactions that could occur if taken with another prescribed drug
- Manufacturer of prescribed drug
- Age of prescribed drug
- How do physicians determine what drug to prescribe and also in what dosage?
- How do physicians and pharmacists keep up with the latest prescribed drugs available?
- How much training did physicians have in pharmaceuticals during college? Pharmacists? Is there on-going training for both?
- Utilizing the knowledge of your professional person, create a real-life scenario with your chosen prescribed drug. State the illness, how much of your chosen drug that he/she would prescribe on a daily basis, what percentage of it that would be lost in a day, how quickly would the patient begin to feel better, what would happen if the patient stopped taking the drug before the prescription was finished, would the patient eventually become immune to the prescribed drug, etc. From this information, write a recursive routine which provides the daily amount of the drug in the patient's body.
- A list of sources.

Stopping a Moving Vehicle

Energy Transformations

Grade 11-12

Subject Area Physics

Overview This project will give an opportunity for the students to discover, in a rather simple investigation, the relationships between potential energy, kinetic energy, and work. A School-to-Work application is described as an introduction to the experiment. A further application having to do with auto safety about how the speed of a moving car is related to its stopping distance is also included as an additional activity. The investigation is written to use a TI-82 graphing calculator but the teacher may adapt the project for use without the graphing calculators as he/she sees fit.

Time Allow two 50-minute class periods for the experiment, one 50-minute period to complete the data analysis and questions, and one 50-minute period for a teacher-directed post-lab discussion and instruction.

SCANS Students gain opportunities to allocate human resources, participate as a member of a team, acquire and evaluate information, organize information, interpret and communicate information, and apply technology to a task. Students develop and reinforce basic skills such as reading, writing, math, listening, and speaking. Creative thinking, problem solving, and reasoning skills are all a part of this project. Development of personal qualities such as responsibility and sociability are enhanced by this project.

Equipment TI-82 graphing calculator
TI-82 graphing calculator to computer interface cable
Computer with TI-82 interface program

Resources None

People None

Materials One ramp per team (approximately 1-1.5 meters long)
One Hall's carriage per team
One mass per team; 0.200 kg - 0.500 kg
One stopwatch per team
Four to six meters of unobstructed floor length
One meter stick
One electronic or equal arm balance per class
One piece of chalk per team

Costs Approximately $20.00 per team

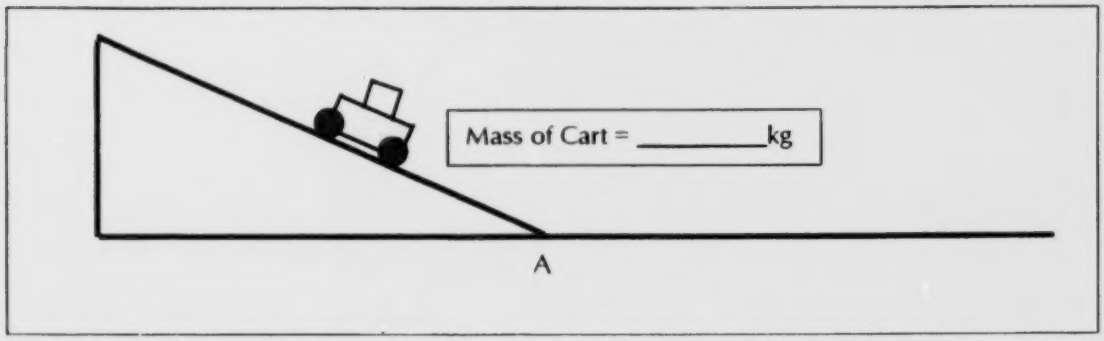
Stopping a Moving Vehicle, continued

Contact Jim Stevens, STW Physics Teacher
Northridge High School
2251 Timber Lane
Dayton, OH 45414

Procedures See worksheet

STOPPING A MOVING VEHICLE

Converting Energy From One Form to Another
Activity Description: Stopping a Moving Vehicle



School to Work Application:

As part of your job in a factory, you need to push a 100-kg cart from one machine across the plant floor to another machine. You normally push the cart at a steady speed of 1.5 m/s. Today there is a rush job that needs to be processed, so to help speed things up, you decide to push the cart at a faster speed. You accelerate the cart up to a speed of 3 m/s, and everything is going smoothly, when your start thinking about how you are going to stop this cart.

Going at the slow speed, you could always stop the cart over a distance of 1 meter. But now that you are going twice as fast, you are wondering if that means your stopping distance will be twice as far. You better decide quickly because your delivery point is fast approaching.

For this activity you will need a ramp, a cart, a scale, a meter stick, a stopwatch and a smooth horizontal surface.

Activity

To determine how the stopping distance is related to the speed of a cart, you will release a cart from various points on a ramp as pictured above.

1. Using chalk, mark off 0.10-m (10 cm) intervals on the ramp.

2. Place a 0.200-kg to 0.500-kg mass in the cart (Hall's carriage)

3. Release the cart and mass from the first 0.10-m interval and start timing when the cart reaches point A at the bottom of the ramp and stop the watch when the cart comes to a stop.

4. Measure the distance the cart traveled on the level surface during this time interval.

5. You may want to try this a few times from the same release point until you are getting consistent results. When you feel comfortable with your results, record them on the chart.

6. Use the time and distance traveled to determine the average velocity (v_{ave}) the cart. Record this on the chart.

7. Assuming that the cart is decelerating at a uniform velocity, use the average velocity to determine the maximum velocity at point A ($v_{max} = 2v_{ave}$). Record this value on the chart.

8. Use a balance to determine the total mass of the cart. Once the mass and maximum velocity are known, you can use the formula $KE = \frac{1}{2}mv^2$, where v is the maxim velocity, to determine the maximum kinetic energy of the cart. Record this value in the chart.

9. Repeat steps 2-7 for at least seven more trials. Each time releasing the cart 0.10 m farther from the bottom of the ramp.

Trial	Stopping Time(s)	Stopping Distance (m)	Average Velocity (m/s)	Maximum Velocity (m/s)	Maximum Kinetic Energy (J)
1	0	0	0	0	0
2					
3					
4					
5					
6					
7					
8					
9					

Activity Questions

1. What was the maximum kinetic energy of the cart for trial #2?

2. What was the final kinetic energy of the cart for trial #2?

NOTE: The change in kinetic energy is calculated by subtracting the initial kinetic energy from the final kinetic energy.

$$\Delta KE = \tfrac{1}{2}m v_{max}^{2} - \tfrac{1}{2}m v_{min}^{2}$$

3. What was the change in kinetic energy of the cart for trial #2?

4. Where did the energy go that the cart had when it had its maximum kinetic energy?

5. Draw a free body diagram of the cart as it is slowing down.

6. What force is acting to slow down the cart?

7. Is the frictional force that is acting to slow the cart the same or different if the cart is moving faster?

8. Enter the maximum velocity in L_1 of your TI-82 and the corresponding stopping distance in L_2. Graph the data with v_{max} on the x axis and distance on the y axis. Interface your TI-82 with the computer and capture your graph. Print a hard copy of your graph and tape it in the space below.

9. Use the regression function on your TI-82 calculator to determine an equation of for the above graph.

10. Use the graph to determine how doubling the velocity affects the stopping distance. You can do this by using the trace function to choose an arbitrary value for x (maximum velocity) on your graph. x_1 = _____. What is the corresponding value for y? y_1 = _____ Now, using the trace function again, go to the value for x that is twice your original arbitrary value. x_2 = _____. What is the corresponding value for y? y_2 = _____. How many times greater is y_2 than y_1? _____

11. Now return to our original problem of trying to stop a moving cart. If the stopping force is the same for each speed and the stopping distance for a cart moving at 1.5 m/s is 1 meter, what is the stopping distance for the cart when its speed is doubled to 3 m/s? _____

12. Consider a 1200 kg automobile traveling at 14 m/s (this is slightly more than 30 miles per hour).

a) How much KE does the car have?

b) If the driver slams on her brakes and brings the car to a sudden halt, how much KE does the car have when it is stopped?

c) What happened to the energy?

d) It takes work to bring about a change in energy. How much work was required to stop the car?

13. Consider the same 1200 kg automobile, this time traveling at 28 m/s (twice as fast).

a) How much KE does the car have?

b) If the driver slams on her brakes and brings the car to a sudden halt, how much KE does the car have when it is stopped?

c) How much work was required to stop the car in this case?

d) How does this compare to the work in problem 12?

e) Work = force x distance. Since the braking force is the same in both problem 12 and 13, how does the stopping distance in problem 12 compare to the stopping distance in problem 13?

Stress Balloon Production Company

Grade 4-8

Subject Area Integrated unit: math, science, language, etc.

Overview Students experience various aspects of a manufacturing company by designing, making, and selling stress balloons to other students in their school.

Time Varied blocks of time over the course of a minimum of one month

SCANS Resources: Allocates time, money, materials, and human resources
Interpersonal: Participates as a member of team, serves customers, leadership, and negotiates
Technology: Selects technology, applies technology
Systems: Monitors and corrects performance, improves & designs systems
Thinking Skills: Decisions making, problem solving, reasoning
Personal Qualities: Responsibility

Equipment Computer with spreadsheet software and Print Shop or paint software
Broom for cleanup

Resources None

People None

Materials Latex helium quality balloons of various colors
Play box white sand and flour
Wide mouth funnels (empty serger thread cones are great)
One-inch hairpin lace loom to facilitate tying balloons (available from knitting department of hobby store)
Several plastic tubs for sand and flour

Costs Up front costs which vary should be financed through issuing stocks. Purchase materials on a "just-in-time" basis to prevent buying more supplies than you'll be able to sell products

Contact Virginia Wysong
Tri-County North School
570 Panther Way
Lewisburg, OH 45338
(937) 833-4330

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All

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Procedures **Organizing the Companies**

Before starting this project be sure to follow your school's policy involving students selling products and handling money. In my school I submitted a detailed written proposal to the principals for their approval. The proposal included a sample of the stress balloons, who would make and sell the toy (5th - 6th grade gifted students), a time line (December-May), and stock prices to finance the project ($.25-.35).

1. Students should be divided into several companies of no more than ten students each. Students should cooperatively organize their companies. Students can apply orally or through written applications for the different positions in the company which might include the following: toy tester, quality control, designer, accountant, advertiser, material control, sales person, production manager, production workers, CEO. All students might want to be production workers in addition to another job since production takes the most time. Some jobs might need assistants, especially the sales persons. Positions can be chosen by the teacher or by the companies themselves.

2. Students next begin making prototypes of the stress balloons. Prototypes might involve combinations of colors or different imprints (see if they rub off), packaging the toys in a fancy package, tying something around the neck, etc. Each company might want to design and make only one design. After prototypes are finished students should apply for patents for any original ideas. Next they should sell stocks to adults in the school to raise their beginning capital to buy supplies from the teacher. Stock certificates should be issued for each company. Investors might be limited to three stocks per company since the intent is to raise enough beginning capital to pay for supplies, but not too many so that a fair dividend can be returned to the investors with enough profit still left to donate to a worthy cause. One student, serving as the accountant, should keep track of all the transactions on paper and then enter all the information into a computerized spreadsheet. For safe keeping each day, all money should be turned over to the teacher who serves as the banker and auditor.

3. Students should begin advertising, manufacturing, taking orders for and selling the toys. The teacher also collects money each day for supplies purchased from the teacher to make the toys.

4. When the project is finished and all the toys are sold, companies should calculate the profit they will return to their stockholders along with the original investment. (Check current stock dividend rates.) The remaining profits can then be donated to a charitable cause such as saving an acre of land in the rain forest or toys for needy children at Christmas.

Procedures continued

Making the Toys: Stress Balloons

Stress balloons are made to squeeze, providing the user with a release of stress!

1. To double the balloon, roll one balloon lengthwise and keep it rolled as you slide it inside another balloon. Unroll the rolled balloons and make sure both balloons neck top edges are flush. Insert the funnel into the balloon necks. For soft stress balloons fill the balloon to the bottom of the neck with flour. For medium stress balloons, fill it with a mixture of sand and flour. For stiff balloons fill only with sand. To tie the balloons stretch both necks across and around a hairpin lace loom to make a loop. Then push the end through the loop and slide it off the curved end of the loom to finish the knot.

2. Wipe off the balloon with a water dampened cloth to remove excess flour or sand.

(Optional) Any toy which is cost effective, safe, and simple enough for students to make could be produced instead.

PERSONAL NOTES

One year my students made magnetic toys placing BBs and plastic animal figures inside a sealed dome made from the clear bottoms of two-liter pop bottles. Another year they made Doodaz which were one by two inch plastic shapes painted with glitter dimensional polymer designs complete with an attached colored paper clip so kids could hook them on their shoe laces, their trapper, or gym bag zipper. The most popular design was our school's panther paw symbol painted in school colors.

The stress balloons were the easiest and the messiest to make. My students sold balloons to first through eight graders who are all housed in the same building. The elementary principal required that her students have their parents sign an order form so that students would not spend their lunch money on the toys. Students turned in their order with their money in sealed envelopes with the morning attendance sheets. My students collected the orders, made the toys and delivered the toys at the end of the day, so that students would take their toys home and not play with them during class time. In our middle school students were permitted to buy the toys during the lunch period.

Students donated money to preserve acreage in the rain forest and to provide help for HIV positive people in Cincinnati.

Sub-Artic Survival

Grade 9-12

Subject Area Science and Social Studies

Overview This project emphasizes problem solving, critical thinking, and teamwork skills. It has proven to be a fun project for students. Very little setup time or teacher explanation is needed. Students work individually and in teams of three to five.

Time Allow one 50-minute period for students to complete this project. About one-third or less of the time should be used for the students to work individually and then during the remainder of the class, the students work in teams.

SCANS Students gain opportunities to allocate time, allocate materials, allocate human resources, participate as a member of a team, exercise leadership, negotiate, acquire and evaluate information, interpret and communicate information. Students develop and reinforce basic skills such as reading, listening, and speaking. Creative thinking, problem solving and reasoning skills are all a part of this project. Development of personal qualities such as responsibility and sociability are enhanced by this project.

Equipment None

Resources None

People None

Materials None

Costs None

Contact James Stevens, STW Physics Teacher
Northridge High School
2251 Timber Lane
Dayton, OH 45414

Procedures **Instructions to the Students**

It is 2:20 p.m. on October 5. You and your team are flying in a light, twin engine amphibian airplane from Labrador to Schefferville, a town in northern Quebec Providence. The airplane develops engine problems and attempts to land at Laurel Lake. Laurel Lake is in the sub-arctic region of northern Quebec Province, near the border with Newfoundland. The plane's hull was punctured upon landing. All team members were able to wade to shore before the wind blew the plane out to deeper water where it sank with the pilot pinned inside. Survivors are wet up to their waists.

The pilot was unable to establish contact before the crash. Ground sightings indicate you are 30 miles south of your intended course and 22 miles east of the iron ore mining town of Schefferville, your intended destination and the nearest known habitation. Schefferville is accessible only by air, there are no roads or railways into Schefferville. Your party was expected to return to Schefferville no later than October 19. A flight notification form was filed with the Canadian Department of Transportation indicating your planned return on October 19. However, a few people are expecting you in Schefferville on October 5.

The area is covered with arctic swamps, small evergreens, and rocky hills. Over 35% of this region is covered by long, narrow lakes that run northwest to southeast. Streams and rivers connect the lakes.

The current temperature is 30 degrees Fahrenheit; however, the temperature ranges from zero to 36 degrees Fahrenheit. There is currently heavy cloud cover, five to seven inches of snow on the ground, snowdrifts, and 13-15 mph winds. The skies are generally overcast this time of year.

All of your team members are in good health. They are in insulated underwear, pants, socks, heavy wool shirts, knit gloves, sheepskin jackets, knitted wool caps and heavy leather hunting boots.

You have $153 in mixed denominations and a handful of loose change. The team has one Swiss army knife and one lead pencil.

The survivors are the actual people in your team. You have agreed to stay together. Individually rank the importance of the items of the following page from one to 15 with one being the most important and 15 being the least important. After each member of your team has ranked each of the items, come to a team consensus on the ranking of each item.

Procedures continued

ANSWER KEY FOR TEACHER

The experts for this survival simulation are Canadian para-rescue specialists. They have received extensive rescue/survival training in both the sub-arctic and arctic regions. Stationed at Summerside, Prince Edward Island, members of the 413th Transport and Rescue Squadron are responsible for air and sea rescue operations in Quebec, Newfoundland, Labrador and the arctic.

Walking away from the crash site would almost be certainly fatal. Walking out is particularly dangerous for those not in excellent physical condition or who are unfamiliar with basic sub-arctic survival skills.

1. **Thirteen wood matches in a waterproof screwtop container.** This is the single most critical item. Protection from the cold and a source of fire are absolute necessities. While other means to start a fire exist, they are unreliable in the hands of amateurs. At night, the fire could also serve as a signal. Since the terrain in this area is high, airplanes in and out of Schefferville might spot it.

2. **Hand ax.** A continuous supply of wood is necessary to maintain a fire. Therefore a hand ax may be the most frequently used item in camp. It is also useful for clearing a shelter campsite, cutting boughs for ground insulation, constructing a frame for the shelter, and butchering in the event the group locates and kills caribou, bear, or moose.

3. **20' X 20' canvas.** Prevailing winds of 13-15 knots will make some protection necessary. The canvas can adequately serve as protection from rain, snow, and sleet. Spread on a frame and secured by a rope, the canvas makes a good tent, or it can be used as ground cover. Rigged as a wind screen, it acts as insulation and holds heat. Its width, contrasting with the terrain make it easily spotted in an air search.

4. **Sleeping bag, down filled with liner.** The possibility of 14 days in the sub-arctic would make a sleeping bag, which is good to -25 degrees Fahrenheit, a key factor in survival. To maximize the bag's effectiveness, the survivors must keep the bags dry at all times.

5. **1 gallon can of maple syrup.** The gallon can of maple syrup has two possible survival uses. Maple syrup is a source of quick energy and some nourishment. Food will eventually be a problem and survivors must value any source. Most plants in the arctic region are edible, especially after boiling. The can itself can be used for cooking these plants. It could also be used for collecting water. Snow should not be eaten. It will cause dehydration rather than relieve thirst. Melt ice instead of snow if possible. It takes 50% more fuel to obtain a given amount of water from snow than from ice.

Procedures continued

6. **250' 1/4" nylon rope, 50# test.** The braided nylon rope could be use to hang any fresh meat away from predators such as bears or wolves. Additionally, you could use rope to tie poles of wood together as supports for the shelter, or it could be used to string the canvas between two trees. Threads of the rope could be used for fishing line or used to construct a willow net for fishing, to construct various traps, including snares and deadfalls, or to string a hunting bow.

7. **Snow shoes.** The snowshoes would be useful for traveling around camp while constructing a shelter and hunting. Since unfrozen lakes and rivers constitute serious barriers, the ability to travel in the sub-arctic is related to over-the-snow traveling equipment. There are not enough pairs of snowshoes for the entire group. However, makeshift snowshoes could be constructed later with branches and either rawhide or rope for travel after the freeze, about December 1 or so. Rivers are the highways of the North in summer and winter, but not in spring and fall. Snow must have a crust on it to expedite travel, soft snow is exhausting to walk through.

8. **Punctured innertube for 14" airplane tire.** Anyone in the group could construct a slingshot from the innertube. Birds are plentiful during the long winter and some birds such as owls, teragants and ravens could be easily approached and killed using rocks or a slingshot. Using the rubber, survivors could make bindings for snow shoes and spring mechanisms for animal traps. The innertube might also be used for more immediate or effective signaling by burning strips of the rubber to produce a black smoke.

9. **Safety razor shaving kit with mirror.** The shaving kit provides several useful items. The mirror is the most powerful tool you have for communicating your presence on a sunny day. In the sunlight, a simple mirror can generate five to seven million candlepower of light. However, heavy clouds cover the sky three-fourths of the time with only one day in ten being fairly clear. The razor blades in this kit could be used along with a pocket knife as cutting edges.

10. **Flashlight, four "D" cell size.** Because of the length of time the survivors may have to wait before help arrives, the flashlight would be needed as an emergency source of light in addition to the campfire. Otherwise, it can be held in reserve as a night time signaling device. However, battery efficiency will drop with temperatures.

11. **One fifth 151 proof rum.** Although liquor is commonly thought of as providing body warmth, it actually causes a loss of body heat. Drinking large quantities of alcohol will speed up hypothermia, which can be fatal. The rum can be used for medicinal purposes, as an anesthetic or disinfectant. The bottle might also be useful as a water container.

Grade Procedures continued

12. Wind-up alarm clock. The wind-up alarm clock has a number of uses. If used as a timepiece, the clock makes it possible for the survivors to locate North. At 2:50 PM, line up the small hand with the sun and a stick. North is centered between the 7 and 8 o'clock positions in the North temperate zone. The intact glass surface can be used as a reflective signal. If dismantled, the internal workings can be used for fishing hooks and lures. Also, you could use the clock itself in camp to establish a routine and to determine signaling and firewatch times.

13. Magnetic compass. A compass in this area is unreliable. Proximity to the magnetic pole produces serious inaccuracies. The iron ore deposits in the area will also produce wide variations in readings. One expert who is very familiar with the territory indicated it is impossible to walk 100 yards and return accurately using a compass in this area.

14. Book: "North Star Navigation". The book, "North Star Navigation," might be helpful for starting a fire or as entertainment. However, since the book's directions could only be used at night, it would be dangerous as a navigation aid. Furthermore, North Star navigation in the subarctic is not reliable because the North Star is quite high in the sky. This makes direction very difficult to determine.

15. Water purification tablets. There is little need for water purification tablets since the water in the area is as fresh and pure as any in the world. The bottle however, could be used for something. Generally speaking, pond water is slightly safer to drink than river water.

Most of these items have some potential to aid you in this situation. However, the most important factor in your survival is to use common sense and work together as a team.

SUB-ARCTIC SURVIVAL

Rank items from 1-15 with the in most important item
Ranked 1 and the least important ranked 15

ITEMS	1 Your Team	2 Team Ranking	3 Expert Ranking
Magnetic compass			
1 gallon can of maple syrup			
1 arctic sleeping bag per person, down filled with liner			
1 bottle of water purification tablets			
20' x 20' heavy duty canvas			
13 wood matches in metal waterproof, screwtop container			
250' ¼" nylon rope, 50# test			
Flashlight, 4 "D" cell size			
3 pairs of snow shoes			
One fifth of 151 proof rum			
Safety razor kit with mirror			
Wind-up alarm clock			
Hand axe			
Punctured aircraft tire inner tube for 14" tire			
Book: "North Star Navigation"			

The Tallest Tower

Grade 10-12

Subject Area Physics or Physical Science

Overview This is a good project to do early in the year to get the students involved in scientific thinking and working in teams.

Time Allow one 50-minute class period for the experiment and a portion of the period on the following day to answer questions and discuss results.

SCANS Students gain opportunities to allocate human resources, participate as a member of a team, acquire and evaluate information, organize information, interpret and communicate information, and improve and design systems. Students develop and reinforce basic skills such as reading, writing, listening, and speaking. Creative thinking, problem solving, and reasoning skills are all a part of this project. Development of personal qualities such as responsibility and sociability are enhanced by this project.

Equipment None

Resources None

People None

Materials Sheet of white paper per student
Sheet of colored paper per team
30 cm. of plastic tape per team
Pair of scissors per student

Costs Less than $5.00

Contact James Stevens, STW Physics Teacher
Northridge High School
2251 Timber Lane
Dayton, OH 45414

Procedures All students should read the entire procedure before beginning the experiment.

Each student will receive one sheet of white paper. Use the white sheet to try out various design possibilities. Think wildly.

Procedures continued

Purpose: The purpose of this experiment is to design and construct the tallest free standing tower from a single sheet of paper and 30 cm. of tape. Students will first try to come up with individual designs using white paper and then work as a team of two to four students using colored paper to build a competition tower.

THE TALLEST TOWER

Before beginning with the colored paper, examine the designs of each group member. Decide which aspects of each design should be incorporated into you final design. The most important aspects of a winning team are communication and cooperation.

Plan ahead. Set a timetable for experimentation and for actual construction. Plan on finishing at least five minutes before the end of the period. Watch your time. Do no fall too far behind your schedule.

Your tower must be free standing for as least five seconds. Measure your tower before it tips over.

Observations and Data:

1. Describe how the designs of other groups are similar to yours.

_____

_____

_____

2. Describe how the designs of other groups are different than yours.

_____

_____

_____

Analysis:

1. What were the limiting factors in your tower's construction?

_____

_____

_____

2. Did your group work well together as a team? _____ What could you do differently to be more effective? _____

_____

_____

Total Quality Problem Solving

Grade 10-12

Subject Area Any

Overview Students will learn to use the problem-solving process and "Quality Tools" to develop solutions to "Real Life" problems.

Time
Eight hours TQM problem-solving training
Two to three days in business solving "real life" problems
One day in school to prepare the team's written and oral presentation of their solution
One morning at the business for students to present their solution to a team of business people

SCANS
All Resource Competencies
All Interpersonal Competencies
All Information Competencies
All Systems Competencies
Applies Technology to Task
All Basic Skills
All Thinking Skills
All Personal Qualities

Equipment
Overhead Projector (optional)
TV/VCR
Computers for completing oral and written presentations
Buses for transporting students to business sites

Resources
Langford Teams Training for facilitator
Tool Book by David P. Langford
Toward Active Learning by Anne Borland Crabbe

People Training facilitator, business sponsors, transportation personnel, parent volunteers. This process works better when students are chosen from groups scheduled with teams of teachers.

Materials Post-it notes, markers, construction paper, index cards, newsprint, word-processing or Power Point software, student team role cards, Saturn car commercials on quality or consumer report ads on quality, and the movies: *Mission Impossible* and *Butch Cassidy and The Sundance Kid*

Costs $20 per *Tool Book* purchased, $400 for each facilitator trained, plus expenses, transportation expenses for students, and $200 miscellaneous expenses

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All

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Contact

Nancy Brown
Fairmont High School
3301 Shroyer Road
Kettering, OH 45429
(937) 296-7701

Procedures

Tasks to be accomplished prior to training students:

Procedures continued

- Contact businesses to explain the project, their roles and responsibilities, and ask them to sponsor a student team
- Have businesses send you the problem that they want the students to solve
- Meet with the parents to explain the project and get their written permission allowing their child to participate
- Arrange for student transportation to and from the business sites
- Arrange for students to use computers to help them prepare their written and oral presentations
- Recruit students to participate in the project and divide them into teams

Student Teams Training

This training is divided into four parts: Introduction, Team Building, Problem Solving, and Problem Solving Practice. The introduction and team-building process takes about two hours, the problem-solving process takes two hours, and the problem-solving practice takes about two hours.

PART 1. INTRODUCTION

Good Morning. Ask for quality good morning. Since we are talking about quality, we need to understand that quality exists in everything. What makes up a quality good morning? (Get answers from group and ask them to demonstrate a quality good morning.)

OBJECTIVES: (transparency)

- To understand the concept of quality and why it is important
- To learn to work together as a team
- To learn how to use and apply total quality problem solving to a real life situation
- To learn how to use the TQM tools in the problem-solving process
- To take responsibility for their own working process
- To produce a TQM presentation defining the problem, causes, and solutions and communicate their solution to a company team

Procedures continued

Review *Problem Solving Flowchart* transparency.

Ask students to define quality. List their definitions on a transparency or board.

Now, knowing this, let's watch these commercials and see if there is anything you would like to add to your definition.

Show clips from TV commercials from Saturn on quality or consumer report pages. Possible additions include: clear roles, critical process, sense of senses, emotions pride, relation to future, and quality advice given. Go over the handouts and transparencies on "What Is Quality", the quality contract, and the need and importance of quality.

PART 2: TEAM BUILDING

Show clip from *Mission Impossible* where Tom Cruise is hanging from ceiling.

Cruise must have had trust in his team to allow them to dangle him from the end of the rope. To work as an effective team what did everyone have to do?

Discussion
Think about the rules you need to have as team members to complete your tasks this week and next week. Use the affinity process to construct rules.

Affinity Process Procedure
(Resource: *Toward Active Learning* by Anne Borland Crabbe pages 75 and 76)

1. Repeat for the students the problem "What rules will you need to have as team members to complete your tasks during this training and during your days in the business?"
2. Give each student post-it notes. Ask each to think of all the rules that are related to the situation. Use one slip of paper for each rule. Allow two to five minutes.
3. Explain to the students that there will undoubtedly be several rules that are related or are somewhat alike (that have an affinity for each other, hence the name affinity diagram).
4. Ask each student to put his or her ideas on their post-it notes on the table or wall. Then, they should examine all of the rules and move the slips of paper to create clusters of ideas that seem to have a relationship. This should be done without talking. It is okay for a student to move an idea that is not her own; it is also okay for another student to relocate that idea to a place that he thinks is more appropriate.
5. Ask the teams to discuss the cluster of rules and to create names for each of the clusters.
6. From their clusters ask the students to make a list of their rules and then print them nicely on a piece of construction paper to be referred to next week.

Procedures continued

Have students check their list with the team checklist. Use transparency.

1. Each person contributes to quality product
2. All people listen to contributors
3. No ideas are "put down"
4. Team progress is charted with written records towards a goal
5. Each person must contribute individual strength
6. Leadership roles will evolve

All of these things must be on your list. You will be checking your ability to behave as a team periodically with the team progress checklist (transparency and handout). Have students add their roles to the team progress checklist at the bottom.

Explain the team progress checklist handout and transparency
Explain the team evaluation handout and transparency

Roles and Responsibilities
A part of working together as a team is clearly understanding the roles and responsibilities of each member and taking their roles seriously. Cannot work by committee or group—there is a difference.

In high functioning teams:

- Everyone is aware of the importance of roles
- Everyone on the team must have a role
- All roles are of equal importance
- Everyone is accountable
- All team members understand that it is important to be successful in their roles
- All team members use their special strengths and talents
- Everyone evaluates their role and checks their perceptions with other team members from time to time
- Problems and conflicts are dealt with as they occur

Have students draw roles from role cards.

PART 3: PROBLEM SOLVING

Use video clip from *Butch Cassidy and the Sundance Kid* where Butch and Sundance are discussing their options in trying to get away from a group of lawmen. Their final decision was to jump off a cliff.

Put numbers on cards. Assign all the groups a number. Explain that we will draw a number later and the group that has the number will make a presentation in front of the class.

Procedures continued

Ask students to view the clip and think about the problem solving process they see there. Show clips several times.

Have students use the affinity process to determine the steps to the problem solving process. Follow affinity process procedure described previously. Explain that we use the affinity process to insure that all students participate in the process with their team. This is a good process for you to use when you are on the job and you are noticing that only one or two people on your team are participating in the team process.

Now each student in the group needs to take a few post-it notes and write down on the notes the steps they saw in the movie clip in the problem-solving process. Be sure to put only one step on each note. After all students write their steps on the post-it notes have the students take the notes and cluster steps that are the same and discuss the best description and order of the problem-solving process.

Direct the students to look at their *Tool Book*, page 42, for flow charts. Have them now take their post-it notes and arrange them in a flow chart so that the group can visually see how the problem solving process works. All groups make a flow chart of the problem solving process. Select a group by choosing a number to present their flow chart to the class and explain why they arranged the steps as they did.

Students stop and do an evaluation of their team's process. After rating themselves they need to average their score and we need to post scores (consensogram in *Tool Book*, page 32) so that the group can see how they are doing in the team-building process. We need to have teams assess their progress as a team several times and each time post the scores so that the groups can see progress.

Students present their solutions to problem solving and discuss the process.

Discuss the problem-solving storyboard and refer students to the tool book to see the types of tools that they can use to facilitate the problem solving process.

PART 4: PROBLEM SOLVING PRACTICE

Students now work through a problem using the process they have learned. The problem should be one in which the students do not have a strong emotional tie but they can relate to or have the expertise to solve.

Start students through the process. Go to gathering data and have students do the fishbone chart.

You create the best way to solve a problem!

QUALITY PROBLEM-SOLVING SEMINAR

OBJECTIVES:

1. To understand the concept of quality and why it is important.

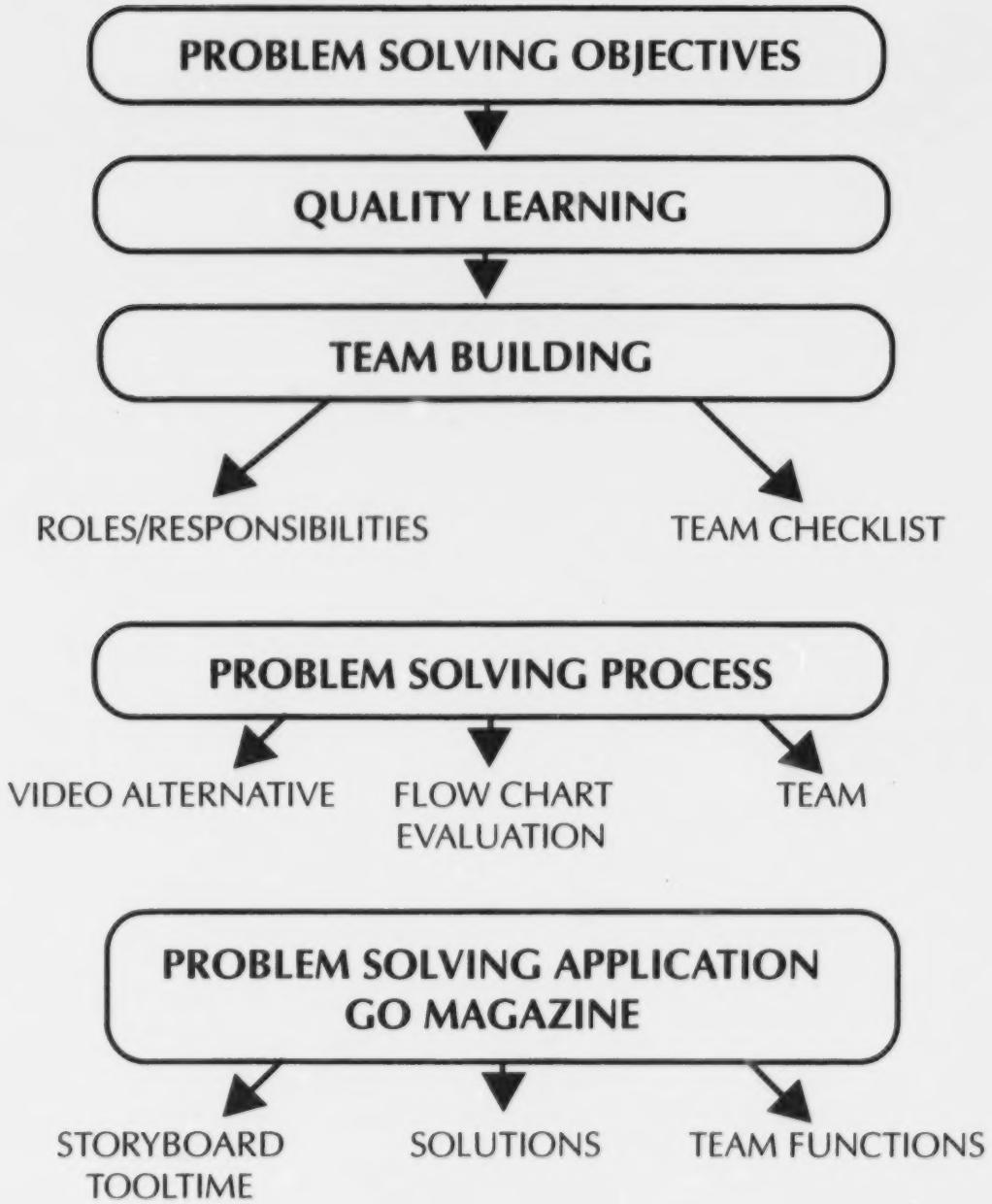
2. To learn to work as a team.

3. To learn to apply quality problem solving to real-life applications.

4. To take responsibility for your working process.

5. To produce a quality presentation defining the problems, causes, and solutions, and communicating the solution(s) to a company team.

PROBLEM-SOLVING FLOWCHART



What is Quality Problem Solving?

Quality problem solving means solving problems to consistently meet or exceed expectations, so that both you and the organization can be successful.

Quality Contract

- Outcomes are achieved through teamwork.
- Each person is committed to continual improvement ancl redesign.
- Each person is committed to being the best at leading or following throughout the problem-solving process.

The Need for Quality

- Our future depends on your success.
- Even the most elementary jobs now require problem solving abilities.
- The increase in knowledge causes the doubling of knowledge every four to five years.
- Each student who drops out of school loses an estimated $240,000 in lifetime earnings.

Why 99.9% Just Won't Do

We'd have to accept:

- 50 newborn babies dropped at birth by doctors everyday
- 22,000 checks deducted from the wrong bank accounts each hour
- 20,000 incorrect drug prescriptions per year
- 16,000 pieces of mail lost by the U.S. Postal Service every hour
- 2 unsafe plane landings per day at O'Hare Airport in Chicago
- 1 hour of unsafe drinking water every month
- 32,000 missed hearbeats per person per year

Suddenly the quest for zero defects makes a lot of sense....

TEAM CHECKLIST

1. Each person contributes to a quality product.

2. All people listen to contributors.

3. No ideas are "put down."

4. Team progress is charted with written records towards a goal.

5. Each person must contribute individual strength.

6. Leadership roles will evolve.

QUALITY PROBLEM SOLVING

Date _____ Team names _____

Time _____ _____

_____

Team Progress Chart

6 5 4 3 2 1

1. Each person contributes to a quality product.

6 5 4 3 2 1

2. All people listen to contributors.

6 5 4 3 2 1

3. No ideas are "put down."

6 5 4 3 2 1

4. Team progress is charted with written records towards a goal.

6 5 4 3 2 1

5. Each person contributes their individual strengths.

6 5 4 3 2 1

6. Leadership roles evolve.

6 5 4 3 2 1

7. _____

6 5 4 3 2 1

8. _____

6 5 4 3 2 1

9. _____

BEST COPY AVAILABLE

TEAM EVALUATION

YOU GET WHAT YOU EXPECT!

WHAT DID I EXPECT?

WHAT I EXPECTED FROM MY ROLE	WHAT I AM DISCOVERING FROM MY ROLE	SUPPORT I NEED TO DO MY ROLE

HIGH FUNCTIONING TEAMS

1. EVERYONE IS AWARE OF THE IMPORTANCE OF HIS/HER ROLE.

2. EVERYONE ON THE TEAM MUST HAVE A ROLE.

3. ALL ROLES ARE OF EQUAL IMPORTANCE.

4. EVERYONE IS ACCOUNTABLE.

5. ALL MEMBERS UNDERSTAND THAT IT IS IMPORTANT TO BE SUCCESSFUL IN THEIR ROLES.

6. ALL TEAM MEMBERS USE THEIR SPECIAL STRENGTHS AND TALENTS.

7. EVERYONE EVALUATES THEIR ROLE AND CHECKS THEIR PERCEPTIONS WITH OTHER TEAM MEMBERS FROM TIME TO TIME.

8. PROBLEMS AND CONFLICTS ARE HANDLED AS THEY OCCUR.

PROBLEM SOLVING STORY BOARD

One way to make sure you are reasoning carefully through the problem-solving process is to use the steps of the Probletunity story board. Complete the checklist below as you solve your problem.

1. Define or state the problem to be solved.

2 . Gather data needed to solve the problem.

Tools: Brainstorming, Affinity Chart, Interrelationship Chart, Consensogram, Fishbone Chart, Survey Process, Spider Chart, Team Progress Chart.

Problem	Facts You Need
What is the problem?	1. What is the current situation? 2. What are the causes of this situation? 3. Is there a relationship among the causes? 4. How will you prioritize the causes?

3. Analyze solution choices and consequences.

Tools: Brainstorming, Force Field Diagram, If...Then Process

Solution Choices	Positive Effects	Negative Effects
What are the solutions? (List in priority.)	What are the forces driving the solution(s)?	What are the forces preventing or blocking the solution(s)?

4 . Select the best solution. Provide good reasons for your choice.
Explain how the solution reflects:
a. relevancy to the problem
b. workability for this situation
c. a basis in reliable. factual information

Tool: NGT Process

5. Outline and implement a Plan for Action.
Identify the actions you need to take.
Identify when the actions will be taken.
Identify who will be responsible for the actions.

ROLES

Checker
- Check the team's perceptions of what going on
- Make sure that the Team Evaluation Sheet is filled out each day on the project and that any problems are addressed

Question Captain
- Keep a list of important questions
- Make sure all questions are answered or will be answered by next meeting.

Observer
- Collect data on teaming skills and give feedback on how the team is doing
- Make sure that the Team Progress Chart is filled out each day on the project and that problems are addressed

Materials Person
- Bring necessary materials to the meeting
- Set up meeting space if any equipment is needed

Timekeeper
- Keep up with time and givre ten-minute warning, five-minute warning, etc., so meeting doesn't run over allotted time.

Recorder
- Record the minutes
- Do chart work if necessary

Leader
- Keep team on task
  Make sure everyone participates
- Lead the discussion for the next agenda

SAMPLE LETTER TO PARENTS

Dear Parent:

An important function of education is to prepare students for their futures in college and/or work. To help meet this objective we would like to offer our students an opportunity to work in partnership with business/industry in an exciting project called TEAMS training.

Within a two-day TEAMS workshop, teams of students will be formed and trained in problem solving techniques and the basic principles of quality improvement. These students will then apply their new skills on a real life work-related problem at a sponsoring employer site. Possible sites are: _____.
Students receive a general description of a problem impacting the organization and for one week arrive at their assigned workplace to apply the problem solving skills received in training. Students gather and analyze data regarding the problem. Their goal is to develop a solution and to propose a plan for reducing or eliminating the problem. At the end of the week, students present a finished plan which could immediately be implemented by the sponsoring organization.

This TEAMS training provides students with a direct learning experience outside of the classroom. In addition, participants learn and apply the principles of Quality Learning, problem solving and data gathering techniques and team skills. Students receive meaningful work related experience learning about how businesses function, and how to apply problem solving skills to improve work processes. These experiences promote critical thinking, statistical based math, team building, data analysis, and group presentations.

As you can see, there are many benefits to allowing your student to participate in such a project. If you would like to learn more about this project, we will be having an informational meeting for parents of interested students on _____ at _____ in _____.

Students from other districts who have participated in this project have returned saying: "I wish I'd had this training earlier in my life." "I've been able to apply the problem solving techniques in all areas of my life."

In order for your son or daughter to participate in this unique opportunity, we must have direct contact with you.

Sincerely,

LEARNING TEAM PROJECT PARENT/STUDENT WAIVER OF LIABILITY; EXPLANATION

The Learning Team Project is an educational program that permits students to leave the school premises for the purpose of receiving training in problem solving, and then applying those skills in an off campus site. Student participation is program will be determined by their agreement to participate, parental perrnission, students' attendance records, and teacher team recommendation. School personnel will be present during the two-day training session. During the problem solving project, the students will be expected to work on the project without direct adult supervision and abide by the Student Code of Conduct. However, the sponsoring organization and the school will provide periodic supervision throughout the project. The program is directed and coordinated by the Secondary Curriculum Coordinator, School-to-Work Coordinator, and Team Teachers.

The purpose of this project is to train students to use a variety of techniques to solve problems, and then apply these skills toward producing "quality" outcomes. This experience is intended to give students a greater comprehension of how to approach and solve problems at school, work, and in their personal lives.

Because students participating in the project will be away from school property and beyond the constant direct supervision of school employees, the School District cannot accept liability for injuries to participants or for property damage or loss. Parent and student signatures on this form are required as a condition of participation in the project.

WAIVER OF LIABILITY

We, the undersigned student and his/her parent or guardian, confirm our understanding that the Learning Team Project is elective, not mandatory. Just as we voluntarily authorize this student's participation, we voluntarily agree that the School District Board of Education and its members, employees and agents shall have no liability for injury, including death, or any damage or loss of property in any manner arising from, or related to, the student's participation in the Project. We agree not to initiate, authorize or participate in any litigation or legal action asserting such liability. We further understand and agree that this Waiver is a reasonable means by which the School District can 1) prevent an expansion of its liability into a virtually unlimited variety of activities it cannot reasonably foresee, supervise or control, and 2) provide a valuable education for students which cannot be replicated in the classroom.

This Waiver of Liability shall apply to all events, acts and omissions for the entire duration of the student's participation in the Learning Team Project.

_____ _____

Date Parent/Guardian

_____ _____

Date Student

LEARNING TEAM CONTRACT

I, _____ , do hereby agree to meet the following standards of performance as a condition for my participation in the Learning Team Project. I agree to...

complete all required documentation.

make every attempt to secure my assignments in advance.

complete all assignments in a timely fashion as agreed upon with my instructors.

attend both training day sessions.

meet for one week, if assigned to a team, for the purpose of participating in a problem-solving situation.

to provide transportation to and from Fairmont on Friday, March 14th, when there is no normal bus transportation.

follow the Student Code of Conduct.

I, _____, (parent/guardian) do give my permission and encouragement for participation in the _____ High School Learning Team Project. I realize transportation to and from the projects location must be arranged by the student and I will provide such, if needed.

_____ _____

Date Parent/Guardian

_____ _____

Date Student

SAMPLE LETTER TO BUSINESSES

Dear Business Partner

You are invited to participate in a project that will help students use problem-solving techniques and total quality tools to develop solutions to your business problems.

[Last year was the first year for this project and judging from the responses from both the businesses and students involved, it was very successful. In the project, students participated in a two day training session in total quality problem solving and then spent five days at a sponsoring business working towards a solution of a real-life problem.]

We would like to duplicate this project this year and need your help as a business sponsor. Sponsors are asked to provide the following:

- A problem the Learning Team of students will address
- A written problem statement defining the process or problem the team will address (this should not be a personnel problem)
- An employer sponsor capable of greeting the students upon arrival at your organization, coordinating their visit, and providing periodic supervision
- A meeting room appropriate for the students to gather and analyze their assigned problem or process
- Notification of the student's mission to the appropriate members of your workforce so they might be available for interviewing, for providing pertinent data, and for viewing a final presentation
- Transportation for your team, if possible
- Optional donation ($100 and up) to help defray students' training and materials costs
- A place in-house where the students may eat

We are targeting student training for March 12th and 13th, 1999 and students will be at your site on March 16th through the 20th. Enclosed you will find the goals for the project and a description of the type of problem needed for the process.

If you are interested in helping us with our project, please fill out the interest survey enclosed and fax it to _____ at _____. If you would like additional information, please contact _____.

Sincerely,

LEARNING TEAMS INTEREST SURVEY

We are interested in participating in the Learning Teams Project at (Name of Company) _____. We understand that we will be responsible for providing the team of students with:

- A problem the Learning Team of students will address
- A written problem statement defining the process or problem the team will address (this should not be a personnel problem)
- An employer sponsor capable of greeting the students upon arrival at your organization, coordinating their visit and providing periodic supervision
- A meeting room appropriate for the students to gather and analyze their assigned problem or process
- Notification of the student's mission to the appropriate members of your workforce so they might be available for interviewing, for providing pertinent data, and for viewing a final presentation
- Transportation for your team, if possible
- Optional donation ($100 and up) to help defray students' training and materials costs
- A place in-house where the students may eat

The contact person is _____

Phone_____ Fax _____

We are willing to donate $ _____ to defray costs.

P.S. If you participated in this problem-solving venture last year we would like for you to give a brief summary about the work done by those students. It would be nice to know if any of the student recommendations were implemented and if so, what the impact has been.

SAMPLE PROBLEMS

The following is a list of problems that the students solved last year:

- Maintenance and repair of buildings is currently "out sourced" to subcontractors. Is this the best alternative for our clients or would maintenance and repair functions performed by "in house" employees provide better, less expensive service to their properties. How can we hire and retain tellers and new account personnel so that we reduce turnover and become fully staffed?
- How can the city develop a cost effective disposal process if we hope to support an expanded recycling center?
- How can we lower the average age of the GO! Section readership and build readership among under 25 age group without alienating older readers?
- What is the most cost-effective way to dispose of unwanted materials?
- How can we design a reuseable pallet for shipping our product?

EMPLOYEE SPONSOR

Each sponsoring employer organization will identify an employee sponsor for each team they host. The employee sponsor will meet the Team at the end of the two-day training and will greet the students on the first day of the internship. Where appropriate, the employee sponsor will coordinate a "tour" of the facilities to orient the teams in their new environment. Throughout the problem solving internship, students will be actively defining and analyzing their assigned problem. To minimize disruptions to the work-site, the employee sponsor will serve as a resource for the Team as they gather and analyze data. Teams are intended to be self-sufficient and do not require employer supervision.

Each employee sponsor is invited to attend the Team training seminar. Attendance is not mandatory; however, employee sponsors will be asked to meet their respective Team prior to the problem-solving internship. The final hour of the two-day training session is scheduled for this purpose. During this time employee sponsors will be asked to share their organizations' problem statement with the students. The two-day training sessions will be held at _____ on _____.

MEETING ROOM

The sponsoring site should provide a meeting room where students can congregate and dialogue as they analyze their assigned problem. The room requires enough chairs for each member of the team, a desk or table to write on, and appropriate lighting for reading and writing. It will be important that students have a place to work together free of outside interruptions.

EMPLOYER SPONSOR RESPONSIBILITIES, RESOURCES AND PROBLEMS

PROBLEM SELECTION

Each sponsoring employer should identify the problem or process to be improved. The following are suggested criteria for problem selection. The problem should:

- Be repetitive, not a one time or infrequently occurring event, must exist now as something that can be studied and flow charted
- Have high enough priority to invest the Learning Team's time
- Be worth improving, potential benefits for improving outweigh the investment to improve
- Be a manageable size, if the process is too long or complicated, use a part of it that fits the criteria.

Upon selecting a process to be improved or a problem to be solved, consider the following questions:

- What data do you have that leads you to believe this is a problem?
- Are those responsible for implementing the necessary changes committed enough to make the changes should this problem be solved?
- Is the research and reasoning behind your process or problem selection documented?
- How were multiple process or problems prioritized? Is this problem high priority?
- Should the process be improved or redesigned?
- How does this opportunity for improvement relate to the organization's purpose and vision? Is the problem important?

PROBLEM STATEMENT

Once the process has been selected and the initial conditions considered, each sponsoring employer will draft a written problem statement. The problem statement is a short paragraph identifying and describing the following:

a) the Current Situation of the existing process or problem
b) the Impact the existing process or problem has on employees, organization, and customers
c) the Desired State to be achieved by solving the problem or improving the process

Each employer will provide their respective Team with the problem statement at the end of the second day of training.

Note: A problem statement should not contain assumed problem causes or proposed/ anticipated solutions.

TEAMS EMPLOYER SPONSOR WORKSHEET

PROCESS OR PROBLEM to be improved

_____

_____

_____

PROBLEM STATEMENT
Current Situation of the existing process or problem

_____

_____

_____

Impact the existing process or problem has on employees, organization, customer, community

_____

_____

_____

Desired State to be achieved by solving the problem or improving the process

_____

_____

_____

Note: A problem statement should not contain assumed problem causes or proposed/ anticipated solutions.

Team Tower Building

Grade 2-8

Subject Area Any subject area

Overview Each team of students cooperatively tries to build the tallest tower from a limited supply of materials.

Time 50 minutes

SCANS Participates as a member of a team: Works cooperatively with others and contributes to the group with ideas, suggestions, and effort
Exercises Leadership: Encourages, persuades, convinces, or otherwise motivates an individual or groups
Thinking Skills: Creative Thinking and Problem Solving

Equipment None

Resources None

People None

Materials Per group:
Five full sheets of typing paper
36 inches of masking tape
Scissors to be used as a tool only

Costs Minimal, if materials are readily available in school office or library.

Contact Virginia Wysong
Tri-County North School
570 Panther Way
Lewisburg, OH 45338
(937) 833-4330

E
M
All

Procedures

1. Groups of four to six students should be assigned to a different area of the room to work either on the floor or on a desk or table. Each group should use the set of materials listed to cooperatively build the tallest tower. The tower may not be attached to anything other than the base table or floor on which they are working. A time limit of 20-30 minutes should be preset by the teacher unless time permits unlimited trial and error by the teams. Ask students to begin by choosing a leader who facilitates the group and a task keeper who keeps the group on task. Encourage students to brainstorm, discuss, and try various ways to solve the problem. At the end of the preset time period the teachers should measure each group's tower vertically the shortest distance perpendicularly from its base to its peak.

2. The teacher should facilitate processing the lesson by asking groups to either put in writing or discuss orally group behaviors that helped achieve their common goal of problem solving and behaviors that hindered the group. (Examples: Lots of talking and suggestions, brainstorming, taking turns, voting, lots of trial and error, lots of questioning, thinking, and analyzing why something didn't work.)

3. (Optional) Repeat the activity with different materials (tissue paper, pipe cleaners, less tape). Choose only one group to do the activity while the rest of the class observes them and lists the positive behaviors that each person contributes to the group. Also video tape the activity so that during the processing phase parts can be played back while members of the class report what they observed from their rubrics.

Working Lines

Grade High School

Subject Area Algebra I

Overview By using real-world data, students will be asked to plot data points, find a best fit line by hand and by using a graphing calculator, predict trends for the future and discuss the importance of models.

Time If data is given, students can complete in one class period (42 minutes) per problem. If data is not given, students should be given one week to find data and complete analysis.

SCANS Information, Systems, Technology, Basic Skills, and Thinking Skills

Equipment Various graphing calculators
Internet access (optional)

Resources Newspapers with business data

People Chamber of Commerce (optional)

Materials None

Costs None

Contact Rosie Matthies
Shawnee High School
1675 E. Possum Rd.
Springfield, OH 45502
(937) 324-9296

Procedures This lesson contains several problems that deal with linear curve fitting. It can be done in several different ways, depending upon the class level and time available. You, as the teacher, can provide the following attached problems that have data given in an already formatted sheet *(Life Expectancy in the United States, Manufacturing Payroll for Clark County, And History of Minimum Wage in the U.S.)*. A second option is to have the students find their own set of data, do their own analysis of linear curve fitting, and draw their own conclusions without prompted questions from the teacher. One caution for this option, if chosen, is to make sure *linear* data is found by the student, especially if they are in a lower level. Nonlinear data is acceptable if students are in an Algebra II class, studying exponential curves, logarithmic curves, etc.

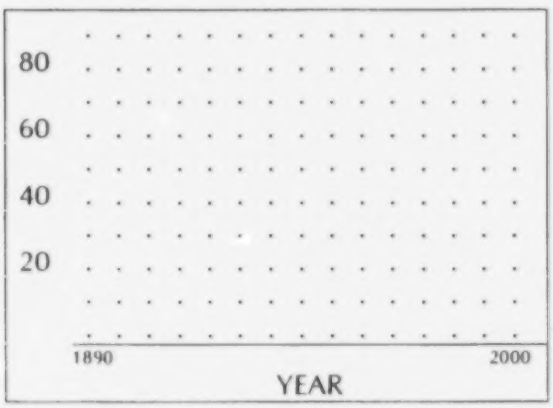
Credit The Working Lines problems were developed with the assistance of fellow educator Don Ellsworth.

WORKING LINES

Life Expectancy in the United States

Year	Men	Women
1900	47.9	50.7
1920	55.4	57.3
1940	61.6	65.9
1960	66.8	73.2
1970	67.0	74.6
1980	70.1	77.8
1987	71.5	78.4

1a. Using the women's data, make a scatterplot of the data and on your calculator.



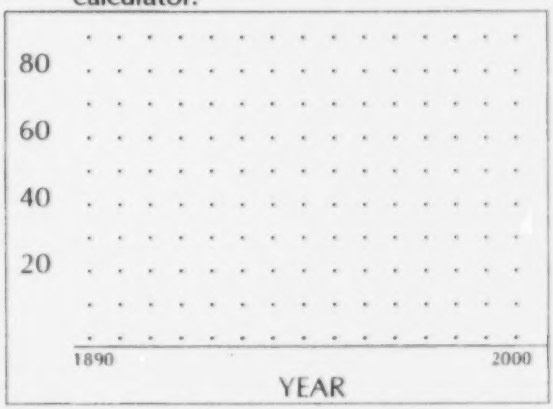
b. Circle the data and then determine the two points that determine a line that BEST describes the data. List the two points below.

c. Using the above two points, find the equation of the line containing them. Show and explain your work.

d. Using the equation in part c, what will be the life expectancy of a woman in 2050? Show and explain work.

e. Using the equation of part c, when will the life expectancy of a woman be 100 years? Show and explain your work.

2a. Using the men's data, make a scatter plot of the data below and on your calculator.



b. Circle the data and then determine the two points that determine a line that BEST describes the data. List the two points below.

3. Is this a good model? Explain. (What is being assumed? What factors may change the outcome?

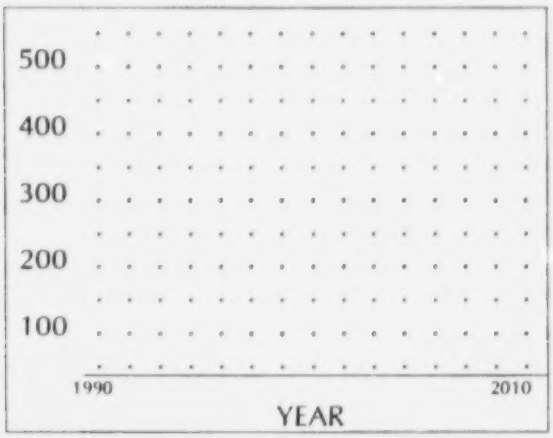
c. Using the above two points, find the equation of the line containing them. Show and explain your work.

d. Using the equation in part c, what will be the life expectancy of a man in 2050? Show and explain work.

e. Using the equation of part c, when will the life expectancy of a man be 100 years? Show and explain your work.

Manufacturing Payroll

Year	Payroll (in millions)
1983	$272
1990	$392
1991	$372
1993	$348



The County Commissioners have discussed the need for more money. One idea is a county income tax. The Commissioners need to know how much money an income tax would generate. The earliest the tax would be implemented is 1998.

Please find an estimate for the income tax for the years 1998 and 2008.

1. Make a scatterplot of the data on the graph above. Also make a scatterplot on your calculator.

2. Circle the data and then determine the two points that determine a line which BEST describes the data. List the two points below.

3. Using the two points in problem 2, find the equation of the line that contains the two points. Show and explain your work below.

4. Using the equation from problem 3, find the manufacturing payroll for 1996 and 2006. Show and explain your work.

5. When will the manufacturing payroll be $1,.00,000,000? (Note this is 1,000 million).

History of the Minimum Wage in the United States

Years (x)	1955	56	61	63	67	68	74	75	79	80	81	90	91
Wages (y)	.75	1.00	1.15	1.25	1.40	1.50	2.00	2.10	2.65	3.10	3.35	3.90	4.25

1. By hand, make a scatterplot of the above data. Draw in what you feel is the best fit line.

2. Using a graphing calculator, determine the equation of the calculator's best fit line.

3. What is the value of the correlation coefficient? Discuss the fit of the line.

4. Using the equation obtained from the calculator, predict when the minimum wage will be $5.25.

5. Using the equation obtained from the calculator, predict what the minimum wage will be in 2050.

6. Research what has happened with the minimum wage since 1991. Discuss if your findings are in line (no pun intended) with your predictions. Detail why or why not you think this is the case.

MAKE SURE YOU SHOW ALL WORK FOR FULL CREDIT.

Classroom Resources

Curriculum, instructional materials, and activities for applied and contextual teaching

Many listings in this section come from: *Making Connections: A Curriculum Ideabook for Teahcers of Applied Academics & Industrial Engineering Systems*, (Columbus, OH: The Ohio State University, Vocational Instructional Materials Laboratory) Copyright 1998. Used with permission.

Language Arts and Communications

Cambridge Educational

Phone: 800-468-4227
Fax: 304-744-9351
Website: http://www.cambridgeol.com

Constructive Communications: Talking Your Way to Success
This 30-minute video uses entertaining vignettes to demonstrate a process for effective communication, including how to identify the effect you hope to achieve, understand the knowledge and attitude of the audience, explain your subject with specific and organized information, and see the positive effects of knowing and understanding yourself.

Effective Listening Skills: Listening to What You Hear
Listening, which may be the most essential communication skill of all, is the focus of this 30-minute video. Students learn the benefits of listening and master the skills by deciding to listen, reading all stimuli, investing spare time wisely, verifying what they hear, and expending energy.

School to Work: Communication Connections for the Real World
In this video series, experts share their day-to-day wisdom and relate directly to the need to connect academic communication skills with the work arena. Each 20-minute tape begins by stressing why communication skills are important to a given work area (e.g., electronics, automotive repair, construction, production technology). Specific communication skills are then highlighted, with numerous on-screen examples modeled for students. Reproducible worksheets are included.

Think Tank: Applied Communication
With the *Think Tank* print units, students use their applied communication skills to solve problems they might actually encounter in a real job situation. Each print unit consists of a series of individual job simulation activities, teacher's guide, and answer sheets. The key critical thinking skills used to solve the problems found in each activity are also identified.

Writing for Results: The Winning Written Report
The importance of good writing skills to job entry and job success is stressed in this 30-minute video. The process presented shows how to analyze your prospective reader; determine the report's purpose; select and narrow the topic; gather, record, and file information; organize the paper; provide concrete and specific supporting material; proofread and revise; and prepare the final product.

Contemporary Books

Phone: 800-621-1918
Fax: 312-540-4687
Website: http://www.tribune.com/financials/1994.annual/ businesses/contemporarybooks.html

Essential Skills for the Workplace (Level One): Obtaining Information and Using Resources
Text covers telephone messages, reference materials, policy manuals, charts and tables, product information for selling, product information for purchasing, mileage charts and transportation schedules, shipping and receiving documents, and measurements (e.g., of size and space, weight, pressure, temperature, time, and money).

Essential Skills for the Workplace (Level One): Using Forms and Documents
Text covers personal forms, paychecks, credit, application and training forms, certification and licensing forms, starting a job, time sheets, benefits on the job, order forms, billing forms, contracts and agreements, warranties, and legal notices.

Viewpoints: Nonfiction Selections
Contains over 20 short pieces of nonfiction (both excerpts and full length) that focus on timely themes such as family relationships, humor, personal freedom, employment, and war.

Communication Skills That Work: A Functional Approach for Life and Work
Book One covers giving and following directions, gathering information; stating a viewpoint, writing labels, lists, and notes; and filling out charts and forms. *Book Two* covers listening and speaking effectively, asking questions and giving directions, interviewing techniques, and writing memos and business correspondence.

Reading Skills That Work: A Functional Approach for Life and Work
Book One covers building vocabulary, interpreting graphics, following directions and procedures, skimming and scanning for information, and developing reference skills. *Book Two* covers interpreting and summarizing written materials, evaluating information and drawing conclusions, classifying and prioritizing information, researching a task, and working and problem-solving as a team.

Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and Technical Education
Phone: 800-654-4502
Fax: 405-743-5154
Website: http://www.okvotech.org/cimc/home.htm

CIMC's English series was designed to reinforce basic skills concepts through practical exercises and practice. Emphasis is placed on functional literacy. Titles include the following:

English: Volume II
Contents provide related vocational information, employability skills, personal development, writing skills, parts of speech, library skills, practical usage, and life skills. Text is supported by 36 transparency masters, three job sheets, and 144 assignment sheets.

Parts of Speech
Text covers nouns, pronouns, conjunctions and interjections, prepositions, adjectives, and adverbs.

Introduction to Writing
Contents focus primarily on the writing of sentences. Text is supported by 24 assignment sheets.

Goodheart-Wilcox
Phone: 800-323-0440
Fax: 708-687-5068

Successful Technical Writing
Proper procedures for producing effective business documents are the focus of this text. Memos, various types of reports, letters, operation manuals, owner's manuals, executive abstracts, and proposals are among the topics covered.

Writer's INC. School to Work: A Student Handbook
This is very much like the handbook described previously, with the same rigor, but the writing samples focus more on workplace writing and speaking and less on creative writing. Major topics include the communication process; the writing process; basic elements of writing; forms of writing; writing in the workplace; research writing: searching for information; speaking and listening; issues in the workplace; and reading, thinking, and learning.

Daily Language Workouts
This flexible teacher's resource includes high-interest language activities designed to help students develop their editing and proofreading skills. The activities are short and fun, take only a few minutes of class time, yet pack a lot of punch. They can be used for oral or written practice to pump students up for effective communication. Activities include daily MUG Shots (sentences containing language blunders in mechanics, usage, and grammar for students to identify and fix); weekly MUG Shot Paragraphs to edit; daily writing practice activities in which writing prompts (photo, quote, graphic) inspire free writing on a variety of topics; sentences for modeling and expanding penned by well-known writers; and show-me sentences, which give students starting points for writing strong, active sentences.

Writer's Express: A Handbook for Young Writers, Thinkers & Learners
This text covers everything from the writing process to historical documents, from study skills to writing riddles, from speaking and listening to solving word problems. Although designed for the middle-school level, these materials could be used for students who need more extensive remediation.

Writer's Files: Grades 9-12
The *Writer's File* for each level provides a sequence of reproducible writing and language activities that can serve as the focus of a new and stimulating writing program when used in conjunction with *Writer's INC* or as a supplement in an existing program. Provided for each level are 18 "sequential" writing activities; 50 or 60 writing workshops; over 200 daily language activities; and numerous reproducible forms, strategies, and resources.

Lakeshore Learning Materials

Phone: 800-421-5354
Fax: 310-537-5403

Lakeshore Basics & Beyond materials are designed for students who are hard to reach, at risk of dropping out, or in need of a fresh approach to learning. If you have students in need of remediation or if you have students who could benefit initially from materials written at a lower (or controlled) reading level with a high interest level, Lakeshore may be a good source for you. Some examples of videos, worktexts, texts, and game/activity books that could be of interest follow:

201 Ready-to-Use Word Games for the English Classroom

Better Writing for Better Jobs Worktext

English Ideas That Really Work

English Teacher's Book of Instant Word Games

How to Write Sentences Video Program

A Picture Is Worth 1,000 Words: Story Starters

Real-Life Communication at Work

Standard English Video Activity Program

Take the Fear Out of Shakespeare
Facing pages present Shakespeare in the original version and in modern translation. The ten plays in this series are available as a set or individually.

Paradigm Marketing Group, Inc.

Phone: 888-445-2875 (toll-free)
Fax: 520-445-2757
E-mail: STWNews@aol.com

Applied and Integrated Academics
Applied and Integrated Academics is an outline software series of three IBM disks designed for use as a supplement for any applied communications curriculum or text (e.g., Applied Communications, AIT, Communications 2000, South-Western Publishing). The set includes *Survey*, a stand-alone program that students can use to design and record survey data; *EMS*, a stand-alone personality program (a simple, yet accurate, Myers/Briggs type test); an integration handbook; and a school-to-work handbook.

Telephone Techniques. Building Communication Skills
This set of six audiocassettes is supported by an accompanying study guide.

Procter & Gamble Educational Services

P.O. Box 599, Cincinnati, OH 45201-0599
E-mail: RHMA61A@prodigy.com

Public Relations Guide
Although written to help teachers and others to use public relations techniques on behalf of their organizations and programs, this guide (available free of charge and reproducible without permission) could easily be used with students in lessons focusing on communication through promotion and advertising. It provides basic information about the role, purpose, and functions of public relations so that readers will be able to develop and implement their own public relations plans. Samples, a glossary of terms, and lists of public relations resources and additional sources of information support the text.

Advertising and the Economy
This 32-page classroom teaching guide includes a profile of advertising's history and its role in the economy, eight reproducible lessons on advertising and the economy, teaching tips for each lesson, a full-color poster depicting advertising's evolution, and a video guide. Although focused on economics, the materials could easily be adapted for use in communications classrooms where the focus would be on writing to sell and recognizing the propaganda techniques used in advertising.

South-Western Educational Publishing
Phone: 800-354-9706
Fax: 800-487-8488
E-mail: search@catalog.thomson.com
Website: http://www.thomson.com/swpco.html

American Literature for Life and Work

British Literature for Life and Work

These anthologies group the literature offerings into high-interest, relevant topics (e.g., community and responsibility, innocence and experience, and choices and possibilities). Each grouping is followed by assignments requiring students to explore, understand, and connect. Students are invited to express their own views, share them with others, work on teams, and make a significant difference in the community. The lessons emphasize practical writing for the real world—meeting the high standards of business, working collaboratively. Workshops at the end of the text give students practice in moving from school assignments to workplace tasks.

Communicating for Success: An Applied Approach

Three of the authors of this text hail from Ohio's Great Oaks Institute of Technology and Career Education. Lessons are not structured around traditional topics such as nouns, verbs, etc. Instead grammar, punctuation, and usage are addressed when they are important to a specific job-related task. In every chapter, students have a chance to practice language skills tied to the tasks in which they are used in business and industry. Each chapter is arranged as follows: introduction, warm-up exercise, practice, and project. Once a skill has been introduced, it is not forgotten; its use is woven throughout subsequent chapters. Chapter topics include communicating at work, communicating definitions, listening and responding, giving instructions, describing a process, describing a mechanism, summarizing, completing forms, communicating messages (memos, letters, and notes), persuading, applying for a job, comparing and contrasting, interviewing for information, using numbers and statistics, presenting reports, and becoming a professional.

USA TODAY
Phone: 800-757-TEACH
Website: http://web.usatoday.com

English: Critical Thinking and Writing

Developed with the National Council of Teachers of English, this guide is designed to help students improve their writing and critical thinking skills using activities with a real-life context through the pages of *USA TODAY*.

Although the next three sources aren't "applied communications" per se, they would be a rich resource for providing content that students could use as the basis for assignments involving reading, writing, speaking, and/or discussion.

Business Today

Developed in cooperation with Future Business Leaders of America, this guide supports the use of *USA TODAY* as a real-world text in learning key business concepts from the national and international business world.

Careers: A Lifetime Journey
Developed in cooperation with the National Career Development Association and the Department of Labor, this career education program provides educators with real-world tools and information to assist students in lifelong career planning. It leads students through self-assessment activities and introduces them to role models.

Today's Issues
Developed in cooperation with the National Education Association, the activities in this program use *USA TODAY* to address the critical issues facing today's teens and to reinforce critical thinking, decision making, cause-and-effect analysis, and goal planning.

Integrated Mathematics and Science

Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and Technical Education
Phone: 800-654-4502
Fax: 405-743-5154
Website: http://www.okvotech.org/cimc/home.htm

Phys-Ma-Tech
To encourage students who do not traditionally enroll in physics to do so, these activity-based materials integrate the academic content of three disciplines—physics, math, and technology—and relate it to real-world experiences. The materials—which are designed to improve high school physics without diminishing the content or rigor of the subject—expose students to a variety of technological devices, systems, and processes. The activities have been tested and can be used, adapted, or expanded for use in a variety of teaching contexts. A videotape is available to support the print materials.

Glencoe/McGraw-Hill
Phone: 800-334-7344
Fax: 614-860-1877
Website: http://www.glencoe.com

Technology: Science and Math in Action
Two student activity texts, each containing five modules, present hands-on activities in which students use scientific and mathematical concepts to solve technological problems. Students do experiments, complete activity sheets, and design and build products. Career information and the history of technology are included. Topics include hydroponics, bridges, printed images, rockets, electricity, recycling, and videos.

Technology, Science, and Mathematics Connections Activities: A Teacher's Resource Binder
Each activity in this *Teacher's Resource Binder* provides a technological problem to be solved and describes the technology, science, and mathematics applications students will use. The technology component provides guidance for designing, constructing, and evaluating a product. The science and mathematics components are related to the product and to real-world problems and situations. Math topics are correlated to NCTM standards. Topics include pollution-free vehicles, power boat, robotic transfer, and rocket payload.

Miscellaneous

Brainstorms – Creative Problem-Solving by Thomas Turner
Scott, Foresman & Co.: Glenview, Illinois, 1990. This is a resource book of starter ideas intended to encourage creative thinking for grades 4-6.

Cooperative Group Problem-Solving Adventures in Applied Creativity by Douglass Campbell
Frank Schaffer Publications, Inc.: Torrance, CA., 1994. This resource book of starter ideas is intended to encourage creative thinking and cooperative group problem-solving for grades 4-8.

Mathematics

American Tech
Phone: 800-323-3471
Fax: 708-957-1137

Practical Math
Designed for use in a refresher course or as a handy reference, this text stresses the practical aspects of math. It covers number theory, decimals, fractions, roots and powers, measurement, basic operation, and formulas. Problems included are oriented to trade and industrial calculations.

Related Mathematics for Carpenters, 2nd ed.
In this text, basic math is applied to practical carpentry. It includes examples and problems for developing the math skills needed for this trade.

Bergwall Productions, Inc.
Phone: 800-645-3565

Bergwall's instructional video programs are designed to correlate with existing applied math curricula, such as the one developed by the Center for Occupational Research and Development (CORD). Sample titles include the following:

Basic Math for Electronics

Conversion of Fractions, Decimals, and Percentages

Decimal Numbers

Flow Charts

Fractions and Decimals

Material and Cost Estimation

Measuring Tools

Measuring Voltage

The Metric Ruler

Multiplication and Division

The Outside Micrometer

Percentages, Ratios, and Rates

Practical Geometry

Precision Measuring Tools

Reading a Ruler

Service Manual and Wiring Diagrams

Shop Math

Size and Location Dimensions

Trigonometry

Cambridge Educational

Phone: 800-468-4227
Fax: 304-744-9351
Website: http://www.cambridgeol.com

Applied Math

This software program is designed to enhance the nationally approved applied math curriculum developed by the Center for Occupational Research and Development (CORD). Each unit contains one computerized lesson and quiz, written handout quizzes, teacher helps, and computerized quizzes related to specific careers, including those in industrial technology. Units—which may be purchased separately, in clusters, or as a total series—cover introduction to the calculator, problem-solving techniques, estimating answers, English and metric measurement, working with graphs and tables, using data, working with straight lines and angles, working with 2-D shapes, working with 3-D shapes, ratio and proportion, using scale drawings, signed numbers and vectors, scientific notation, precision accuracy and tolerance, problems involving powers and roots, using formulas, solving linear equations, using graphical data, nonlinear equations, using statistics, working with probabilities, right triangle relationship, trigonometric functions, factoring, relationships and functions, quadratic equations, systems of equations, inequalities, applied geometry, working with computer spreadsheets, working with computer graphics, and quality control.

Applied Mathematics Program (AMP)

The diagnostic/prescriptive AMP software (IBM, Macintosh, Apple) provides vocational and academic instructors with a means of assessing, instructing, and testing math skills directly applied to specific occupational training programs, including electro-mech tech, industrial tech, auto mechanics, construction, electronics, metals/welding, and auto body.

Basic Math Skills for the Real World

This menu-driven IBM software program assesses and improves basic math skills while stressing their importance in the job market. In the first part, students work at a variety of jobs where they are challenged with typical job tasks involving basic math skills. As they perform the skills, their ability levels are assessed and they receive suggestions for areas needing improvement. The second part of the program shows how math skills are used daily in over 20 jobs. In the final part, games challenge students to solve problems in order to save the world, escape a maze, or travel through time.

Math for Principles of Technology

The 14 software units in this series are designed for use in programs using Principles of Technology, the applied physics course designed by the CORD/AYE. The units provide an alternative teaching tool (e.g., for students who need to make up work or who need to spend more time mastering a concept), as well as an evaluation tool. Units provide math lessons and quizzes relating to the following concepts and principles: force, work, rate, resistance, energy, power, simple machines, momentum, waves and vibrations, energy converters, transducers, radiation, light and optical systems, and time constants. Available for IBM and Macintosh.

Math with Micrometers

The purpose of this software program (IBM, Macintosh, Apple) is to help students learn how to use the micrometer, how to measure in inches and metric units, and the basic math skills needed to use the micrometer.

Multimedia Reading a Rule: English and Metric Measurements

This resource includes the basics of inches, feet, yards, halves, quarters, eighths, and sixteenths, the steps in calculating simple and compound fractions using the ruler; and a drill and practice in reading a ruler including simple and compound fractions. The metric instruction covers the same topics but using the metric system. It is available on CD-ROM for IBM and Macintosh and includes videos, audio, still photos, illustrations, animation, text materials, interactive lessons, and reproducible quizzes.

Occu-Math Lab

In these lab activities, 14 different measuring tools used in major occupational clusters—including auto mechanics, construction, drafting, electronics, metals, and technology—are used to show students, in a hands-on format, how math applies to the world of work. Each individual lab activity includes a laminated how-to sheet, color transparency, real job-based measuring instrument, and applied problem-solving activities. Also included are reproducible activity sheets providing basic instruction and remediation in basic skill competencies.

Prevocational Math Software
These four software packages teach addition, subtraction, multiplication, and division with whole numbers, decimals, fractions, and improper fractions. They are available for IBM, Macintosh (B&W or color), and Apple.

Reading a Ruler
The software packages (IBM, Macintosh, and Apple) in this series teach students the basics of English and metric measurements. An 18-minute videotape on reading English and metric rulers is also available.

School-to-Work: Vocational Math Connections
Each IBM software package in this series provides students with applied math practice in a specific occupational area, including automotive, drafting/ manufacturing, construction, and electronics. To increase student interest, various formats are used: games, real-life work site problems, two-dimensional color graphics, mouse interface, menu-driven, etc.

Think Tank: Applied Math
With *Think Tank*, students use their applied math skills to solve problems they might actually encounter in a real job situation. Each print unit consists of a series of individual job simulation activities, teacher's guide, and answer sheets. The key critical thinking skills used to solve the problems found in each activity are also identified.

Center for Occupational Research and Development (CORD)

Phone: 800-231-3015
Fax: 817-772-8972
E-mail: stw@cord.org
Website: http://www.cord.org

Applied Math: Course Materials
These course materials stress applications in real-world job situations and allow for a broad range of student entry-level capabilities. The six activity sessions for each unit serve as a guide to the sequence of activities. An implementation notebook is also available. The teacher's guide for each unit contains a page-by-page annotation of the text for students, a teaching outline, correlation of unit goals and sub-unit objectives, supplementary resource lists, information about video segments, detailed lab prep instructions, and related information sources.

Contemporary Books

Phone: 800-621-1918
Fax: 312-540-4687
Website: http://www.tribune.com/financials/1994.annual/ businesses/contemporarybooks.html

Math Problem Solver: Reasoning Skills for Application
Text emphasizes translating word problems into mathematical language.

Math Skills That Work: A Functional Approach for Life and Work
Book One covers working with whole numbers and money; sorting and filing numerically; writing checks; filling out receipts, purchase orders, and forms; balancing checkbooks; and interpreting paycheck stubs. *Book Two* covers using decimals, fractions, and percents; reading thermometers, rules, scales, and gauges; interpreting graphs and data; calculating commissions and interest; determining unit prices and extended costs; and understanding budgets and schedules.

Number Power Review
Text covers from whole numbers to algebra, and prepares students to take—and pass—standard math assessment and competency exams.

Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and Technical Education

Phone: 800-654-4502
Fax: 405-743-5154

CIMC's Mathematics series emphasizes applied practice. Each instructional package is specifically oriented toward students pursuing vocational training and is supported by assignment sheets. Titles include the following:

Whole Numbers

Fractions

Measurement

Decimals and Percents

Geometry

Delmar Publishers

Phone: 800-354-9706
Fax: 800-487-8488
E-mail: search@catalog.thomson.com
Website: http://www.thomson.com/delmar

Basic Technical Mathematics, 6th ed.
Math principles, illustrative examples, and problems throughout this text have been carefully selected to be representative of work situations confronted by entry-level workers in major vocational-technical occupations.

Technical Mathematics
Using a highly visual approach, this text provides over 5,000 problems and exercises covering a wide variety of professional fields to reinforce important mathematical concepts and provide opportunities for students to develop on-the-job problem-solving skills.

Technical Mathematics with Calculus
This text contains the same material as *Technical Mathematics*, with additional chapters that cover calculus—from an introduction through differential equations and numerical methods. It provides over 8,500 problems and exercises covering a wide variety of professional fields.

Vocational-Technical Mathematics, 3rd ed.
Practical examples from various occupations are shown in this text to illustrate the actual on-the-job uses of basic math, algebra, geometry, and trigonometry. Step-by-step instructions are provided for solving problems on the job. Emphasis is placed on the ability of the student to think and work with equal ease with both English and metric systems.

Glencoe/McGraw-Hill

Phone: 800-334-7344
Fax: 614-860-1877
Website: http://www.glencoe.com

A Mathematical Journey
This text introduces students to the unexpected ways in which math can be useful in everyday life. Through art, history, psychology, biology, politics, economics, finance, and sports connections, the text encourages students to get involved with the math skills they learn. With three levels of activities in each chapter, a variety of exercises, and interesting analogies, this program is designed to encourage students to think mathematically as they learn to question, discover, and experiment with the world of math.

These texts provide relevant applications and connections to encourage students to investigate the content; problem-solving opportunities to give students a deeper understanding of math concepts and sharpen their critical-thinking skills; extended projects to give students the opportunity to work in cooperative groups or individually on long-range projects; activities using manipulatives and the graphing calculator; and Tech Prep applications that use real-life problem solving to show students how the math skills being learned are used in the workplace.

Merrill Algebra 1: Applications and Connections

Merrill Algebra 2 with Trigonometry: Applications and Connections

Merrill Geometry: Applications and Connections

Merrill Mathematics Connections: Essentials and Applications
Written for students not planning to attend college, this text presents topics in a step-by-step manner, with algebra introduced in chapter one and its use integrated throughout the remainder of the text. Connections to other mathematical topics and real-world applications are included to help enhance student understanding.

Goodheart-Wilcox

Phone: 800-323-0440
Fax: 708-687-5068

Applied Mathematics
Designed to teach sound math skills through realistic applications, the text integrates math concepts with real-world technical applications. Practice problems are reinforced with step-by-step sample problems. Concepts covered include solving word problems; fractions; percentage; personal finance; graphs; units of measure, perimeter, area, and volume; reading tools of measurement; signed numbers and operations; algebraic equations and inequalities; solving problems with algebra; applied trigonometry; scientific and engineering notation; basic relationships of electricity; and introduction to estimating.

Basic Mathematics
Step-by-step instructions in this combination text-workbook are reinforced with sample problems illustrating the application of each basic math skill in various occupations. Exercises and drills are provided to help students develop accuracy and speed in the math skills covered.

Houghton Mifflin Company

Phone: 800-733-2828
Fax: 800-733-2098
Website: http://www.hmco.com

Integrated Mathematics
The goal of this text is to develop students' abilities to explore and solve mathematical problems, think critically, work cooperatively with others, and communicate ideas clearly. The units included in this (the first of three texts) are exploring and communicating mathematics; using measures and equations; representing data; coordinates and functions; equations for problem solving; ratios, probability, and similarity; direct variation; linear equations as models; reasoning and measurement; and quadratic equations as models.

Integrated Mathematics, Teacher's Edition
The teacher's edition discusses the integrated math program, presents teaching strategies, and provides information on how to use the teacher's edition. The student text with answers and teaching notes is included.

Mathematical Connections: A Bridge to Algebra and Geometry
Topics covered in this text include arithmetic to algebra; integers; equations; graphs and data analysis; geometry; number theory and fraction concepts; rational numbers, ratio, proportion, and percent; circles and polygons; statistics and circle graphs; probability; inequalities and graphing on the coordinate plane; surface area and volume; and polynomials.

Lakeshore Learning Materials

Phone: 800-421-5354
Fax: 310-537-5403

Lakeshore Basics & Beyond materials are designed for students who are hard to reach, at risk of dropping out, or in need of a fresh approach to learning. If you have students in need of remediation or if you are looking for simple, reproducible hands-on activities and cooperative projects for mathematics, Lakeshore may be a good source for you. Some examples of videos, worktexts, texts, and activity books that could be of interest follow:

Algebra and Geometry Videos

Hands-on Math Activities

Hands-on Measurement Program

Math for Careers Worktext

Math for the Real World Worktext Program

Math Measurement for the World of Work

Math Stories for Problem Solving Success

Real-World Math Through Science Activity Series

Real World Math Worktext Series: Math for Employment

Vocational Math Series

Working Makes Sense Activity Book

Mathematical Association of America (MAA)

Phone: 800-331-1622
Website: http://www.maa.org

Learning by Discovery: A Lab Manual for Calculus
These 28 laboratory modules can be used as lab components or assigned as independent projects.

The Laboratory Approach to Teaching Calculus
In this text, 26 academic institutions that have used the laboratory approach to teaching calculus evaluate their experiences and tell what has worked for them and what has not. A range of experiences is presented.

National Tooling and Machining Association

Phone: 800-832-7753
Fax: 301-248-2755
Website: http://www.ntma.org

Mathematics for Machinists
Using a self-paced approach, students progress through activities emphasizing the application of math to the working environment. References are made to shop prints, practical work, and problem solving.

Practical Mathematics for Metalworking Trainees
Focused specifically on the machining industry, this text presents the elements of math that must be mastered before a student can become proficient in machine shop setup procedures. The materials provide students with an intensive, but practical, working knowledge of arithmetic (fractions, mixed numbers, decimals, and related conversions); algebra (algebraic rules, equations, and symbols); geometry (axioms, definitions, propositions, and symbols); trigonometry (the unit circle, functions and laws, tables, and interpolation); and metrics (introduction, conversion, and dimensions).

Prentice Hall

Phone: 800-288-4745
Website: http://www.prenhall.com

Technical Mathematics, 2nd ed.
Topics covered in this text include numerical computation; introduction to algebra; simple equations and word problems; functions and graphs; geometry; right triangles and vectors; factors and factoring; fractions and fractional equations; systems of linear equations; determinants; matrices; exponents and radicals; quadratic equations; oblique triangles; radian measure, arch length, and rotation; graphs of the trigonometric functions; trigonometric identities and equations; ratio, proportion, and variation; exponential and logarithmic functions; complex numbers; and precalculus material. Discussion of many technical applications is included to show that mathematics has real-world uses.

South-Western Educational Publishing

Phone: 800-354-9706
Fax 800-487-8488
E-mail: search@catalog.thomson.com
Web site: http://www.thomson.com/swpco.html

Algeblocks
These reproducible lab activities and hands-on, student-friendly manipulatives help students experience and visualize algebraic concepts at a concrete level. It is also available in an interactive software version.

Algebra 1: An Integrated Approach
This text uses a thematic approach to teaching algebra, with real-life applications, interdisciplinary connections, and connections within mathematics. The chapters cover data and graphs; variables, expressions, and real numbers; linear equations; functions and graphs; linear inequalities; linear functions and graphs; systems of linear equations; systems of linear inequalities; absolute value and the real number system; quadratic functions and equations; polynomials and exponents; polynomials and factoring; geometry and radical expressions; and rational expressions.

Algebra 2: An Integrated Approach
Similar in format to *Algebra 1* described above, this text covers modeling and predicting; real numbers, equations, and inequalities; functions and graphs; systems of linear equations; polynomials and factoring; quadratic functions and equations; inequalities and linear programming; exponents and radicals; exponential and logarithmic functions; polynomial functions; rational expressions and equations; conic sections; sequences and series; probability; trigonometric functions; and trigonometric equations and identities.

Math Matters: An Integrated Approach
Similar in format to *Algebra 1* and *Algebra 2*, this three-book program reinforces the connections between algebra and geometry, while developing problem-solving skills. Working with themes that apply to their everyday lives, students explore new math concepts and generalizations by weaving together number sense, algebra, geometry, statistics, and logic.

Sunburst Communications

Phone: 800-321-7511
E-mail: service@nysunburst.com
Website: http://www.nysunburst.com

Data Visualization: Meaningful Math
Using dozens of examples based on real-world situations, this text helps students learn how to describe data with graphs and statistics, discover the best way to describe a set of data, read what the data is saying, and communicate the information through a picture.

Math Vantage Videos—Patterns Unit
Math becomes a living subject through these five motivational videos developed by the Nebraska Mathematics and Science Initiative. Designed to enable students to use patterns to explain, create, and predict situations, each topic covered emphasizes problem-solving techniques. Separate videos cover discovering patterns; patterns with ten; sequences and ratios; tessellations; and networks, paths, and knots. Although developed for students in grades 6-9, these videos could easily be used as supplementary resources for students needing remediation. A teacher's resource book supports the videos.

Visualizing Algebra: Algebra Problems and Projects for the Function Analyzer
Designed to be used with *Visualizing Algebra: The Function Analyzer*, this text provides activities for exploring such topics as points and functions in the coordinate plane; investigating functions in symbolic, graphical, and numerical forms; studying polynomial functions and composition of functions; factoring polynomials; and solving equations.

USA TODAY

Phone: 800-757-TEACH
Website: http://web.usatoday.com

How to Teach Math with USA TODAY
Designed in partnership with the National Council of Teachers of Mathematics, this teaching guide has students solve real-world math problems using mathematical reasoning. The supplementary student *Stat Book* uses baseball as its theme and challenges kids to use computer statistics to draft their own fantasy league teams. Although the materials are designed for middle school level, they contain ideas that could be adapted and used in applied classes at the senior high school level.

Vocational Marketing Services

Phone: 800-343-6430

Algebra by Example
After a pretest that pinpoints students' areas of weakness, this software presents hands-on problem-solving experience. Help functions are included to assist students through problems one step at a time. Covers arithmetic operations; real numbers; equations in one variable; using formulas; graphing equations; linear equations in two variables; addition, subtraction, multiplication, and factoring of polynomials; exponents, logarithms and quadratic equations; and word problems. It is available for IBM only.

Construction Geometry
This text contains special construction concepts and graphic solutions to practical problems encountered by builders.

Introduction to Linear Measurement
This package presents the English and metric systems, covering how measurement skills are used, as well as the conversion and computation of fractions. It includes a video, teacher's handbook, and ten student handbooks.

Live-Action Video Series
These videos present mathematical topics using animation and an electronic chalkboard. They can be used for classroom presentations and to help individual students needing extra help, review, or remediation. Videos are available for the following topics: percents, decimals, fractions, pre-algebra, basic word problems, basic number concepts, and basic geometry.

Math to Build On
An easy-to-follow format is used in this text to present the basic math skills used in the construction trades (fractions, decimals, basic geometry, and trigonometry). Memory aids, practical applications, and calculator use are included.

MathWare, Ltd.
Phone: 800-255-2468
Website: http://www.mathware.com

MathWare sells a variety of books for use in conjunction with the Texas Instruments graphing calculator.

MIDDLE SCHOOL:

TI-82 Graphing Calculator Activities for Middle School Math by Charles Lund

Math and Science in Motion: Activities for Middle School by Chris Brueningsen, Elisa Brueningsen, and Bill Bower

ALGEBRA, PRE-CALCULUS, AND CALCULUS:

Exploring Quadratic Functions with the TI-83 or TI-82 Graphing Calculator by Bob Alexander

TI-83 or TI-82 Mini-Labs: Algebraic Investigations by Phil De Marios

Sensor Sensibility: Algebra Explorations with a CBL TI-82 or TI-83 and Sensors by Jack Randall

Calculus Explorations by Paul Foerster

Discovering Calculus with the Graphing Calculator by Mary Margaret Shoaf-Grubbs

Introduction to the TI-92: 37 Experiments in Precalculus and Calculus by Charles Lund and Edwin Andesen

STATISTICS:

Exploring Statistics with the TI-83 by Brendan Kelly

Statistics with the TI-83 by Gloria Barrett

PROBLEM-SOLVING:

Problem Solving with the TI-83 by Gene Olmstead

Time, Value, and Money: Applications on the TI-83 by Roseanne Hofmann and Charles Hofmann

Miscellaneous

"Sine of the Times" by Naomi Thiers Lui
Techniques, September, 1996, pp. 24-26.

Science

American Chemical Society Career Education

Phone: 800-227-5558
Fax: 202-872-4615
Website: http://www.acs.org

Science and Technology in Society (SATIS) Curriculum Materials
This 12-volume set contains 120 different activities to help teachers relate important issues in technology or society to current science lessons. Black-and-white pages are copyright-waived so teachers can make as many copies as needed. A comprehensive index is provided to help teachers select appropriate activities. A teacher's guide gives further ideas, resources, and assistance in teaching using nontraditional approaches.

Cambridge Educational

Phone: 800-468-4227
Fax: 304-744-9351
Website: http://www.cambridgeol.com

Multimedia Applied Biology/Chemistry
This resource covers the following three units: natural resources, air and other gases, and nutrition. It is available on CD-ROM for IBM and Macintosh and includes videos, audio, still photos, illustrations, animation, text materials, interactive lessons, and reproducible quizzes.

Principles of Technology
The 14 software units in this series are designed for use in programs using *Principles of Technology*, the applied physics course designed by the Center for Occupational Research and Development (CORD) and the Agency for Instructional Technology (AIT). The units provide an alternative teaching tool (e.g., for students who need to make up work or who need to spend more time mastering a concept), as well as an evaluation tool. Units cover the following concepts and principles: force, work, rate, resistance, energy, power, simple machines, momentum, waves and vibrations, energy converters, transducers, radiation, light and optical systems, and time constants. It is available for IBM and Macintosh.

Principles of Technology Multimedia Series
Designed to be used with the CORD/AIT applied physics materials, these CD-ROMs provide training and testing capacity related to the 14 units listed in the previous description. It is available for IBM and Macintosh.

Think Tank: Applied Science
With *Think Tank*, students use their applied science skills to solve problems they might actually encounter in a real job situation. Each print unit consists of a series of individual job simulation activities, teacher's guide, and answer sheets. The key critical thinking skills used to solve the problems found in each activity are also identified.

Center for Occupational Research and Development (CORD)

Phone: 800-231-3015
Fax: 817-772-8972
E-mail: stw@cord.org
Website: http://www.cord.org

Applications in Biology/Chemistry: A Contextual Approach to Laboratory Science
The *Applications in Biology/Chemistry* materials consist of 12 units: natural resources, water, air and other gases, continuity of life, nutrition, disease and wellness, plant growth and reproduction, life processes, microorganisms, synthetic materials, waste and waste management, and community of life.

Applied Biology/Chemistry Teacher's Guide
The teacher's guide for each of the 12 units contains a page-by-page annotation of the text for students, a teaching outline, correlation of unit goals and subunit objectives, supplementary resource lists, information about video segments, detailed lab prep instructions, and related information sources.

Principles of Technology: Course Materials
Principles of Technology is designed to prepare students more effectively for technical careers. The first class for each unit is an introduction and overview of the unit's contents. The last class is designed for a review/summary and test. The 24 intervening lessons are divided into four sub-units of six classes each.

Goodheart-Wilcox

Phone: 800-323-0440
Fax: 708-687-5068

Energy: Sources/Applications/Alternatives
This text is designed to support industrial/technology education programs.

Kendall/Hunt Publishing Company

Phone: 800-228-0810

ChemCom—Chemistry and Community: A Solution with Substance
Produced by the American Chemical Society, this text uses intriguing activities to make students aware of chemistry-related issues in their community and their potential contributions to those issues. Students learn and use chemical facts and concepts as needed to understand the societal issues being addressed, and their interest in chemistry grows as they discover its real-world applications.

Miscellaneous

Sciencewise Book 1 & 2 by Holley Dennis
Critical Thinking Books & Software: Pacific Grove, CA, 1996. A resource book of science-based lessons focusing on discovering the scientific process through problem-solving for grades 3-6.

The following teacher resource manuals provide hands on chemistry lessons involving industry chemistry activities for grade 7-12 science students:

Science Fare–Chemistry at the Table edited by Mickey Sarquis
(Mentor Industry: Procter & Gamble), Terrific Science Press: Miami University, Middletown, OH, 1995. (513-727-3200)

Strong Medicine–Chemistry at the Pharmacy edited by Mickey Sarquis
(Mentor Industry: Hoechst Marion Roussel, Inc.), Terrific Science Press: Miami University, Middletown, OH, 1995. (513-727-3200)

Dirt Alert–The Chemistry of Cleaning edited by Mickey Sarquis
(Mentor Industry: Diversey), Terrific Science Press: Miami University, Middletown, OH, 1995. (513-727-3200)

Fat Chance–The Chemistry of Lipids edited by Mickey Sarquis
(Mentor Industry: Henckel), Terrific Science Press: Miami University, Middletown, OH, 1995. (513-727-3200)

Social Studies

Miscellaneous

"Making Social Studies Social" by James Delisle
Educational Leadership, Vol. 44, May, 1998, p. 80. This resource presents ways of teaching social studies to fourth grade students by basing it on the students' experience and what they want to learn.

"Bringing Literature to Life" by Chip and Beth Avery
Techniques, October, 1996, pp. 26-28.

Career Education

The World of Work series contains twelve, 60-page books with a 3^{d} and 4th grade reading level and 3^{d} through 6th grade interest level, each giving an overview of the career. They are published by Rosen Publishing, Inc. New York, N.Y., 1997.

The World of Work – Choosing A Career in Animal Care

The World of Work – Choosing A Career in Banking & Finance

The World of Work – Choosing A Career in Computers

The World of Work – Choosing A Career in Cosmetology

The World of Work – Choosing A Career in Film, Television, or Video

The World of Work – Choosing A Career in the Helping Professions

The World of Work – Choosing A Career in Hotels, Motels, & Resorts

The World of Work – Choosing A Career in Law Enforcement

The World of Work – Choosing A Career in Music

The World of Work – Choosing A Career in Nutrition

The World of Work – Choosing A Career in the Restaurant Industry

The World of Work – Choosing A Career in Transportation

Career Discovery Encyclopedia
J.G. Ferguson, Chicago, 1996. This resource contains six volumes of over 500 articles on all categories of occupations.

"Bringing the Workplace into the Classroom" by Brian Bottage and Lynne Osterman
Educational Leadership. Vol. 44, May, 1998, pp. 76-77. This is a description of an institution in Minnesota, which helps link important job skills with classroom lessons and graduation standards.

Info-Tech: Making the Connection from School to Work by Kathleen C. Duck
Northwest Ohio School-to-Work Alliance, 1998. A classroom management and career-readiness program for junior high students. This packet contains four handbooks for teachers, students, employers, and parents. Contact Ms. Duck at Anthony Wayne Junior High, 6035 Finzel Road, Whitehorse, OH 43571.

Support Resources

Other references of a general nature that support applied and contextual teaching strategies

Internet

The Internet is a rich source of information helpful to both teachers and students.

Employer Profiles	**http://www.careermag.com/employers/index.html** A brief description of various companies in general, as well as specific job openings and requirements is available at this site.
On-line Career Planning	**http://www.myfuture.com** Students may investigate four different sections: personal finance, military opportunities, career help and beyond high school. It is useful for grades 7–12.
Career Explorer	**http://www.navpic.org/ncc/assessinterests.html** This site provides links to other sites which help assess career interests.
Job Listings	**http://www.libraryspot.com/jobfeature.html** **http://www.headhunter.net** **http://www.jobdirect.com** **http://www.careermosaic.com** **http://www.ajb.dni.us** **http://www.monsterboard.com**
Company Directory	**http://www.companiesonline.com** Students can find out about 60,000 public and private companies.
Math-related Sites	**http://www.kidsbank.com** The Millionaire Calculator allows students to input rates of interest, salary, and current savings to determine how long it will take to become a millionaire. Other information at this site gives brief paragraphs for grades 4–8, describing the fundamentals of money and banking.

http://www.carpoint.msn/loancalc
Using the Loan Calculator, students in grades 5-12 may input selling price of a car, interest rate, and length of loan to calculate the monthly payments and the total purchase cost of the car.

http://www.ti.com/calc/docs/othermth.htm
This site (part of the Texas Instrument site) is for math and science teachers. Examples include math forums, Eisenhower National Clearinghouse lessons, math contests, and current technology information.

http://www.forum.swarthmore.edu/special2.html
This site links users to lessons in algebra, geometry, precalculus, and other math topics.

http://www.bhs-ms.org/calculus.htm
A.P. Calculus projects completed and detailed by Bloomington High School students.

http://www.ed.gov
This U.S .Department of Education site has excellent links to "Other Resources". It also has listings of programs, grants, and fellowships.

http://galaxy.einet.net/galaxy/science/mathematics.html
This site links users to resources in algebra, applied mathematics, calculus, geometry, statistics, and topology.

http://ericir.syr.edu/virtual/lessons
This site is a gateway to teacher-created materials and curriculum resources from various locations, including CNN, Newton's Apple, and the Discovery Channel.

Other Sites

http://www.m-ms.com/factory/index.html
The M & M Candy Factory Tour offers an animated pictures of how M & M's are made for grades 1–4.

http://www.ncsu.educ/sciencejunction/terminal/lessons/coast/educator.html
With Remote Authentic Learning, students can investigate, research, and debate a solution to a real problem on the Carolina coast.

Books

Awakening Genius in the Classroom by Thomas Armstrong—1998
This author asks educators to look beyond traditional understandings of what constitutes genius. Armstrong describes 12 different qualities such as curiosity, sensitivity, inventiveness, imagination and joy. He explains how influences in the home, school and popular media "shut down" the genius in students. Readers will find dozens of suggested activities and helpful resources to provide "genius experiences" and create a genial climate in the classroom. ASCD ISBN 0-87120-302-2

Awakening Your Child's Natural Genius: Enhancing Curiosity, Creativity, and Learning Ability by Thomas Armstrong—1991
A practical guide for parents and teachers that includes chapters on creative approaches to music, art, history, science, math, and reading. Tarcher/Putnam.

Multiple Intelligences: The Theory in Practice by Howard Gardner—1993
In the fifteen years since the publication of his seminal *Frames of Mind*, thousands of educators, parents, and researchers have explored the practical implications of multiple intelligences (MI) theory. In this book Gardner brings together previously published and original work to provide a coherent picture of what we have learned about the educational applications of MI theory from projects in schools and formal research over the last decade. Basic Books ISBN 0-465-01 822-X

Teaching with the Brain in Mind by Eric Jensen—1998
This book balances the research and theory of the brain with successful tips and techniques for using that information in classrooms. From its primer on brain biology to in-depth discussions of emotion, memory, and recall, *Teaching with the Brain in Mind* is an invaluable tool for any educator looking to better reach students through truly brain-compatible teaching and learning. ASCD. ISBN 0-87120-2-9

The Myth of the A.D.D. Child by Thomas Armstrong—1995
This book challenges the misdiagnosing of millions of children with attention deficit disorder and questions the overuse of psychoactive drugs in treating hyperactivity. Fifty non-drug strategies are included for increasing self-esteem and making the most of vitality and creativity. This is a practical guide for parents and educators. Plume. ISBN 0-452-27547-4

Seven Ways of Knowing by David Lazear—1991
This book surveys research on the theory of multiple intelligences and its relevance for today's teachers. It gives practical strategies for awakening the full spectrum of intelligences, techniques for developing and nurturing them, and tools to structure lessons that incorporate multiple intelligences. Skylight Publishing. ISBN 0-932935-39-7

Seven Ways of Teaching by David Lazear—1991
In this book David Lazear shows how to create lessons that draw upon the many ways of knowing that you and your students possess—and how to transform your classroom into a place where fun and learning take place at the same time. You will learn how to expand your teaching repertoire by exploring hundreds of new ways for you to present information. Skylight Publishing. ISBN 0-932935-32-X

Superteaching by Eric Jensen—1988
In this book you will discover the following: how to build a foundation for success; how to prepare to make it all happen; secrets to a successful delivery and presentation; four keys to better student communications; a discovery process to active learning; and why a vision is necessary for renewal. Turning Point. ISBN 0-8403-4592-5

The Role of the Teacher in the 21" Century by Mary Renck Jalongo—1991
The author engages the reader in an exciting odyssey as she develops her thesis that the improvement of education is a human enterprise The skillful blend of theory and practical application sets this book apart from others that have attempted such a marriage. National Educational Service. ISBN 1-879639-00-9

A Different Kind of Classroom by Robert J. Marzano—1992
Robert Marzano describes the Dimensions of Learning Program, a comprehensive K- 12 instructional framework that teachers can use to improve the way they plan instruction, design curriculum, and assess student performance. Based on the best of what researchers have found out about how children learn, Dimensions provides teachers with the tools for building a truly learning-centered approach to schooling ASCD. ISBN 0-87120-192-5

Education on the Edge of Possibility by Renate Nummela Caine and Geoffrey Caine—1997
In this book the readers will find out how the authors took their theory of learning which is based on a holistic interpretation of brain research, and strived to bring it to life in two schools The book details Caine's work in the schools, reports the results, and introduces surprising conclusions about how educators will have to think and function to succeed in the 21st century. ASCD. ISBN 0-87120-282-4

Improving Schools from Within by Roland S. Barth—1990
Noted educator Roland Barth argues that those closest to students—teachers, principals, and parents—are the most powerful sources for school change. Drawing on his years of experience as a teacher, principal, and university faculty member, Barth shows how communications, collegiality, and risk taking among adults in the schoolhouse can create an atmosphere of learning and leadership for all. Josey-Bass Publishers. ISBN 1-55542-368-X

Multiple Intelligences in the Classroom by Thomas Armstrong—1994
This book helps the educator bring the MI theory into the classroom every day. The author helps you explore your own intelligences, introduce students to the theory, develop MI lessons, conduct MI assessments, and more. There are also innovative suggestions for further study that will enable the educator to extend her/his knowledge and develop her/his own applications of MI theory. ASCD. ISBN 0-87120-230-1

The Mindful School. How to Integrate the Curricula by Robin Fogarty—1991
This book is designed to help teachers see how they can diminish the "barriers" between different subjects and provides a spectrum of inventive approaches to curricular integration. It is a practical tool for educators interested in helping students see the connections between the things they learn. It is a handbook of strategies that bridge ideas for lessons and for learners. Skylight Publishing. ISBN 0-932935-31-1

Why Do I Have to Learn This? By Dale Parnell—1995
The author makes it clear that what really counts in the end is that students see meaning in their education. The book's contextual, learner-centered goals demonstrate how to overcome barriers to achieving real excellence at all levels of education. These views, when implemented, will make the teaching-learning process more appealing and meaningful for both teachers and students. CORD Communications. ISBN 1-55502-704-0

Teaching and Joy edited by Robert Sornson and James Scott—1997
This book is a collection of inspiring stories by people who share a vision of schools, families, and communities where human beings experience joyful learning. A multitude of perspectives are brought together that show how joyous both the learning experience and the teaching experience can be. ASCD ISBN 0-87120-271-9

Emotional Intelligence by Daniel Goleman—1995
This fascinating and persuasive book argues that our view of human intelligence is far too narrow, ignoring a crucial range of abilities that matter immensely in terms of how we do in life. Goleman shows the factors at work when people of high IQ flounder and those of modest IQ do surprisingly well. *Emotional Intelligence* includes self-awareness and impulse control, persistence, zeal and self-motivation, empathy and social deftness. These are the qualities that mark people who excel in real life. The good news is that EM is not fixed at birth. Goleman shows how EM can be nurtured and strengthened in all of us. Bantam Books. ISBN 0-553-09503-X

Working with Emotional Intelligence by Daniel Goleman—1998
Drawing on his access to business leaders around the world as well as studies conducted in more than 500 organizations, Goleman reveals the skills that distinguish the star performers in every field: self-awareness, self-confidence and self-control; commitment and integrity; the ability to communicate and influence, to initiate and accept change. Goleman demonstrates that these competencies are at a premium in today's job market. Bantam Books.

Teenagers Preparing For The Real World by Chad Foster
Real World Education, 105 Ferry Road, Suite 120, Newtown, PA 18940-3425.

The Physics of Everyday Phenomena: A Conceptual Introduction to Physics by Griffith Thomas
McGraw Hill, 1992.

Toward Active Learning: Integrating the SCANS Skills Into the Curriculum by Anne Borland Crabbe
Richmond Community College, P.O. Box 1189, Hamlet, NC 28345-1189

Maintaining Effective Advisory Committees
Vocational Instructional Materials Laboratory, Ohio State University.

Global Understandings: A Framework for Teaching and Learning by Charlotte C. Anderson with Susan Nicklas and Agnes Crawford
This book contains field-tested sample unit plans and performance assessments for integrating global education into existing school programs. Call ASCD at 800-933-2723.

Experiences in Visual Thinking by Robert H. McKim
Boston, MA: PSW Engineering, 1980. A collection of exercises for stimulating inventiveness and the imagination are contained in this resource.

Films and Videos

Powers of Ten (film, 9 minutes)
Charles and Ray Eames, producers, 1978 Pyramid Film and Video, Box 1048, 2801 Colorado Ave., Santa Monica, CA 90406; 800-421-2304; $125 (purchase); $60 (rental for educators) The film evokes wonder in its viewers as it takes them on a journey into micro-and macro-worlds (from subatomic particles to the universe) by powers of ten.

Mr. Jelly Belly's Factory Tour (video, 8 minutes)
Herman Goelitz Candy Company, 25 2nd St. North, Suite 180, St. Petersburg, Florida 33701. A tour of the factory for grades 1-5.

School-to-Work Resources

Books and Publications

AVA Product Sales
1410 King Street
Alexandria, VA 22314
Phone: 800-826-9972, ext. 317
Fax: 703-683-7424

Powerful Partnerships: School-to-Careers Success through Business and Education Cooperation, editor Ann Dykman
You'll learn how both business and schools have benefited from partnerships and a host of other "how-to's" including recruiting partners, planning activities, measuring results, setting up work-based learning experiences, involving business in curriculum development, arranging industry externships for teachers and addressing the legal and workforce concerns of managers and labor unions.

Teaching for Understanding: Through Integration of Academic and Technical Education by Gene Bottoms and Deede Sharpe
This book explains clearly what integration is (and is not), why it makes sense, what conditions support effective integration and ten steps for getting started. Actual high school programs are highlighted and the authors show how you can incorporate these programs and activities into your school.

JIST Works, Inc.
720 North Park Ave.
Indianapolis, IN 46202-3431
Phone: 317-264-3720
Fax: 317-264-3709

America's 50 Fastest Growing Jobs compiled by Michael Farr
Uses data and other contributions from various U.S. Department of Labor publications to project job growth and provide job descriptions, tables on occupations by training required, and growth projections by industries.

The Occupational Outlook Handbook
Includes current descriptions for more than 250 jobs, based on the U.S. Department of Labor, Bureau of Labor Statistics Bulletin 2500 with the same title.

Corwin Press, Inc.
2455 Teller Road
Thousand Oaks, California 91320
E-mail: order@corwin.sagepub.com

Other Ways to Win by Kenneth C. Gray and Edwin L. Herr—1995
This book was written for those students in the academic middle of our high school classes, their parents, and their teachers – to alert them to the fact that the key to future economic security is not education per se, but attaining the occupational skills that lead to high skills/high wage work. In Part I, the *one way to win* belief is explored in detail. In Part II the secondary and postsecondary experiences of students in the academic middle are analyzed. And in Part III, the authors outline three major steps and various strategies that high school educators can take to modify the high school program in order to create *other ways to win* for the average student.

Teaching the New Basic Skills by Richard J. Murnane and Frank Levy
The Free Press, 1230 Avenue of the Americas, New York, NY 10020, 1996.
No longer is a high school diploma the ticket to the middle class. By telling stories of real people in real businesses and real schools, the book shows the skills students need to get decent jobs and how schools can change to teach those skills.

Making High Schools Work by Gene Bottoms, Alice Presson, and Mary Johnson—1992
Southern Regional Education Board, 592 Tenth Street, N.W., Atlanta, GA 30318, 404/875-9211. This book describes the High Schools That Work Consortium's two major goals, ten key practices and six key conditions for creating high schools that work for career-bound students.

National Alliance of Business
1201 New York Avenue, NW
Suite 700
Washington, DC 20005
Phone: 800-787-2848
Fax: 202-289-2875
E-mail: info@nab.com
Website: http://www.nab.com

Foundations For Life: A Blueprint for Better Business and Stronger Communities Through School-to-Work—1996, 158 p.
This guide shows businesses how to work with educators to develop School-to-Work programs.

STW and Career Web Sites

http://www.stw.ed.gov
National School-to-Work Learning Center

http://www.ed.gov
Check out for grant opportunities

http://www.ed.gov.FREE
FREE = Federal Resources for Educational Excellence. A new one-stop web site for teaching and learning resources.

http://www.ohio-stw.com
Ohio School-to-Work

http://www.stwclearinghouse.org
A new repository for all STW information in Ohio developed by the State University Education Deans

http://stats.bls.gov/emphome.htm
Learn about the latest employment outlook information with Bureau of Labor Statistics employment projections.

http://www.school-to-careers.com/
Designed to distribute information on school-to-careers to eductors, students and business. Includes School-to-Career curriculum guides and information links on the Internet.

http://www.state.oh.us/obes
Ohio Bureau of Employment Services employment and training information.

http://www.aspensys.com/eric2/welcome.html
ERIC (Educational Resources Information Center) is a nationwide network that acquires, catalog, summarizes and provides access to education information from all sources.

http://noicc.gov
The National Occupational Information Coordinating committee is the gateway to occupational, career and labor market information for educators. NOICC's Career Development Training Institute has a virtual library of career development resources. Also find hyperlinks to state career information delivery systems.

http://www.jobshadow.org
National site for Groundhog Job Shadow Day

http://www.achieve.org
National STW information clearinghouse

http://www.careernet.org
Wisconsin's student career guide – CareerInfoNet

http://www.careermag.com
Career Magazine

http://www.petersons.com
Peterson's Guide to Education and Careers

http://www.occ.com
Online Career Center

http://ncrve.berkeley.edu
National Center for Research in Vocational Education; view complete products catalog and full-text versions of many publications online.

http://www.jff.org
Jobs For the Future is a national, non-profit organization that conducts research, proposes policy innovation, designs systems, and provides technical assistance to develop innovative workforce development solutions for business, education and communities.

http://www.sreb.org
Southern Regional Education Board's site for High Schools That Work

We Want Your Opinions on the Guide

We have made every effort to design this guide to be a handy resource for you to infuse School-To-Work into your classroom. Hopefully, you will find each lesson plan is easy to employ and meets your particular goal.

We are committed to making the guide even better. To help us continually improve the quality of the guide, we would appreciate your opinion. After you have a chance to use the guide, please share with us your opinion, using the following evaluation form. Please mail, fax, or e-mail the completed form to the address below.

	Highly Agree 1	2	3	4	*Highly Disagree* 5
The layout and visual design made it easy for me to locate the plans I needed.	○	○	○	○	○
The resource section contained many helpful references.	○	○	○	○	○
The guide helped me better understand School-to-Work.	○	○	○	○	○
The guide gave me ideas on how to build School-to-Work into my lesson plans.	○	○	○	○	○
I will be using the guide again.	○	○	○	○	○
I will recommend the guide to my colleagues.	○	○	○	○	○

Please share any suggestions you have for improving the guide.

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Send this form along with your unit or lesson plan to: Ms. Faye M. Flack, Project Manager, Region 4 School-to-Work, Sinclair Community College, 444 W Third Street, Bldg. 12-201, Dayton, OH 45402-1460, Fax: 937-512-5164, E-mail:fflack@sinclair.edu

We Want Your Opinions on the Lesson Plans

If you have used any of the lesson plans in this guide, please take a few minutes to share your evaluation with us. Duplicate this form as needed. Use one form for each plan.

Name (optional) _____

School District (optional) _____

Grade and/or Subject _____

Name of unit or lesson you used _____

Please rate the lesson on a scale of 1 to 5, by checking the appropriate circle.

	Highly Agree				*Highly Disagree*
	1	2	3	4	5
Overall, the lesson plan was well described.	○	○	○	○	○
Procedures were easy to follow.	○	○	○	○	○
Time estimates were accurate.	○	○	○	○	○
I contacted the teacher who authored this plan. (1 = no; 5 = yes)	○				○
Reference to the SCANS competencies will help me in designing other lesson plans.	○	○	○	○	○
Identification of resources and people were helpful.	○	○	○	○	○
Worksheets (if available) were well designed and easy for students to follow.	○	○	○	○	○
Student response to the lesson was favorable.	○	○	○	○	○
The lesson plan accomplished my School-to-Work goal.	○	○	○	○	○
I intend to apply the approach in this plan to other lessons I teach.	○	○	○	○	○
I would recommend this lesson plan to a colleague	○	○	○	○	○

Please share any suggestions you have for improving the lesson plan.

_____

_____

_____

_____

Send this evaluation to: Ms. Faye M. Flack, Project Manager, Region 4 School-to-Work, Sinclair Community College, 444 W Third Street, Bldg. 12-201, Dayton, OH 45402-1460, Fax: 937-512-5164, E-mail:fflack@sinclair.edu

We Want Your Contributions

If you have units or lessons which demonstrate a School-To-Work methodology and are willing to share them with other teachers, we would like to hear from you. We will consider all submissions for inclusion in our next edition.

If your contribution is accepted for publication in the guide, you will receive a cash award of $50.00 and have your plan posted on our Website. We will also send a press release to your local newspaper.

To submit a contribution, please *copy* and complete the form below and the lesson plan format attached. Send them to the Regional Office of School-to-Work (see address below). We will give preference to lessons submitted in the approved format and strongly encourage you to use the format provided.

Name _____

Address _____

City, State, Zip _____

Home Phone _____ Personal Fax _____

Personal E-mail _____

Occupation _____ Grade Level _____ Subject _____

(If the occupation, grade level, and subject lines above do not fully describe your position, please do so on this line: _____

School Building _____ District _____

School Address _____

City, State, Zip _____

School Phone _____ School Fax _____

School E-mail _____

Please give us contact information for your area newspaper.

Newspaper _____

Address _____

City, State, Zip _____

Phone _____ Fax _____

Send this form along with your unit or lesson plan to: Ms. Faye M. Flack, Project Manager, Region 4 School-to-Work, Sinclair Community College, 444 W Third Street, Bldg. 12-201, Dayton, OH 45402-1460, Fax: 937-512-5164, E-mail:fflack@sinclair.edu

To be considered all submissions must be received by September 30, 1999.

Proposed Lesson Plan

Please use this format when submitting a lesson plan. It is not necessary to use the actual form.

Grade _____

Subject Area _____

Overview _____

Time _____

SCANS _____

Equipment _____

Resources _____

People _____

Materials _____

Proposed Lesson Plan, continued

Costs

Contact

Procedure

Credit

Include all attachments and worksheets referenced.

Order Form

To order additional copies of this guide and video, complete this form. send with a check or money order made payable to Region 4 STW/Sinclair Community College and mail to:

Ms. Faye M. Flack
Project Manager, Region 4 School-to-Work
Sinclair Community College
444 W Third Street, Bldg. 12-201
Dayton, OH 45402-1460

Purchaser

Name _____

School _____

Address _____

City _____

State _____

Zip _____

Phone _____

Ship to (if other than purchaser)

Name _____

School _____

Address _____

City _____

State _____

Zip _____

Item	Price		Qty		Extended Price
Box set (guide & video)	$30.00*	X	_____	=	$ _____
Guide only	$25.00*	X	_____	=	$ _____
Video only	$5.00*	X	_____	=	$ _____
Total					$ _____

*Price includes shipping.

Allow 2 weeks for processing and shipping.